

CodeX

Christ College
of Engineering,
Irinjalakuda

Department of
Computer Science
and Engineering



Prof. Achuthsankar S. Nair

Smart India
Hackathon

മെഷീൻ ലേണിംഗ്
ആർട്ടിഫിഷ്യൽ ഇന്റലിജൻസിലെ പുതുവസന്തം

GAME DEV
REPORT

"DEFENDING THE ROMAN
EMPIRE"-HISTORY AND
PROSPECTS





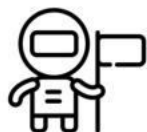
Vision.

Creating socially committed engineers with professional competency and excellence in Computer Science and Engineering through quality education.



Mission.

1. To achieve technical proficiency by adopting effective teaching-learning strategies which promote innovation and professional expertise.
2. To facilitate skill development of students through additional training by collaborating with industry to broaden their knowledge.
3. To promote excellence in research, development and consultancy services rooted in ethics, in order to emerge as responsible engineers.



Program Specific Outcomes.

1. Analyse and design computation systems by applying the attained knowledge in programming language and algorithms, system software, database management, data communication, networking and allied areas of Computer Science and Engineering.
2. Apply software engineering principles and practices to develop efficient software solutions for real world computing problems.



Program Educational Objectives.

- CSE Graduates, within three-five years of graduation should
1. Demonstrate their expertise in solving contemporary problems through design, analysis and implementation of hardware and software systems.
 2. Adapt to a constantly changing world through professional development and continuous learning.
 3. Develop teamwork, leadership and entrepreneurship skills required to function productively in their profession.



Fr. JOHN PALIAKARA
EXECUTIVE DIRECTOR

I very much appreciate the efforts of our CSE Department in bringing out their departmental magazine. At a time when we are all living under the shadow of uncertainty brought about by the deadly Covid19, this magazine is a refreshing attempt to remind us all that we too can make ourselves useful in our own little and or constructive ways. I pray that this may serve as a beacon of hope for all who read it and may it be catalyst for many to nurture their creative selves. Hats off to the CSE Department for this wonderful initiative.



FR. JOY PAYYAPILLY
JOINT-DIRECTOR

It is very heartening to know that our CSE Department is coming up with their digital magazine during this unprecedented Covid19 time. To be able to let the creative juices flow under such challenging times is a testament to what values the CSE Department stands for. Kudos to this well thought-out initiative. May this magazine succeed to achieve its intended purpose. I convey my best regards to all who toiled to make this magazine a reality.



Dr. SAJEEV JOHN
PRINCIPAL

Technology is evolving at a dizzying rate and our class rooms are not designed to keep pace with it. This magazine brings staff and students on a common platform to share and display the ideas and creative talents.

I congratulate the team of students and Faculty for their tireless efforts that have come to fruition in the form this digital magazine. I wish all the best for this great initiative.



Dr. REMYA K SASI
HEAD OF DEPARTMENT

The whole world has changed after the outbreak of the pandemic COVID-19. Hereafter history may mark events as AC (After Corona) and BC (Before Corona). The rhythm and pace of the world may go relative to the flow of COVID-19. Even in developing and under developed countries education and other basic services go online. Governments have to try their level best to ensure basic necessities available to common man. Conventional business ventures may fail and new business ideas may evolve.

As engineering students, you are getting an opportunity to listen to the happenings around the world. Apply your engineering knowledge and skills wherever necessary, for the betterment of our nation.

I congratulate the entire team working behind the technical magazine.

Dear Reader,
Greetings to you !!

This magazine is the outcome of the collective efforts and aspirations of many and I would like to express my gratitude to each one of them. This wouldn't have been achievable without the support and guidance from **Rev Fr John Paliakara CMI**, Executive Director, **Rev Fr Joy Payyappilly CMI**, Joint Director, **Dr Sajeew John**, Principal, **Dr Remya K Sasi**, H.O.D(Computer Science and Engineering Dept), magazine incharges **Sukrutha A.K** and **Nandhini J Warriar** and **Simon N Pallan**, President, Code. I would like to appreciate and laud all the students for their remarkable contributions that made up the essence of this venture. The articles we have here illustrate the fact that the technical minds of our society are no less when it comes to creative writing or in artistically expressing their philosophical and technological insights.

"CodeX"(2020-21), the technical magazine of the Computer Science and Engineering Department of Christ College of Engineering, has been assembled to be an edifying insight to the tech world. The articles will enlighten you on various technological and ingenious themes. We have been honoured with an article by **Prof. Achuthsankar S. Nair**, Hon. Director, Dept. of Bioinformatics, University of Kerala, Thiruvananthapuram, on the topic Machine Learning which is unquestionably illuminating. I really honor the effort of the entire editorial team who worked hand in hand to make this publication possible. I hope that this magazine executes its purpose and becomes an inspiration for yearly editions.

Thank You



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*Our
Team*

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ARTIFICIAL INTELLIGENCE



ADITH
S2 CSE

What makes a Computer system Intelligent?

Google defines intelligence as having intelligence. So how can a computer be intelligent?

Of course, the answer is Artificial intelligence.

It all began when the Mathematician Alan Turing asked a simple question 'Can Machines Think?'

What is Artificial Intelligence?

At its core, AI is the branch of computer science that aims to answer Turing's question. It is an attempt to replicate human intelligence in machines and such machines are programmed to think like humans and mimic their actions.

From Siri to autonomous cars, AI is progressing at a faster pace than ever. AI can incorporate anything from Google's search algorithm to IBM Watson to autonomous weapons.

Artificial Intelligence is broadly divided into two:

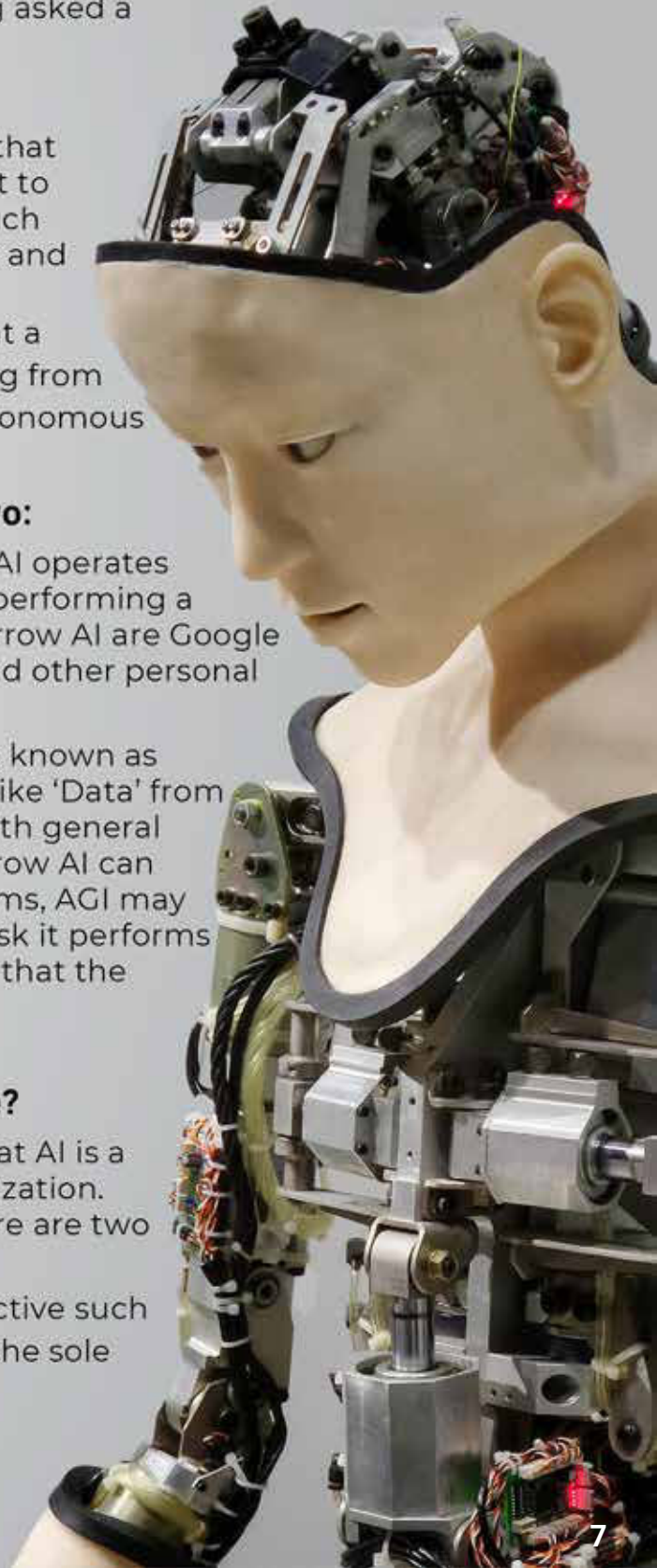
1. **Narrow AI**- also called Weak AI, this branch of AI operates within a limited constrain. It is often focused on performing a single task extremely well. Some examples of narrow AI are Google search, Image recognition software, Siri, Alexa and other personal assistants, self-driving cars.
2. **Artificial general intelligence (AGI)**- AGI , also known as Strong AI is the kind of AI that we see in movies like 'Data' from Star Trek: The Next generation. It is a machine with general intelligence and is much like humans. While narrow AI can outperform humans at the specific task it performs, AGI may outperform humans at almost every cognitive task it performs and has immense computational power at hand that the humans may not be able to match at all.

How can AI be dangerous?

Will it be a threat to human life?

Tesla and SpaceX CEO Elon Musk has claimed that AI is a fundamental risk to the existence of human civilization. When considering how AI can be dangerous there are two scenarios:

1. The AI is programmed to do something destructive such as a nation developing super-intelligent AI with the sole purpose of destroying political enemies.



2. The AI is programmed to do something beneficial but it develops some other way which it might think is an easier route to achieve its goal but that might turn to be devastating for humans.

AI safety:

The AI research is progressing so rapidly that we will cross a threshold of complexity and capability where AGI is a reality. This could be seen as a point of no return, like some other scientific discoveries such as nuclear fission, which will change the course of human history. The AI may reach the point where humans can't reason how or why it does what it does.

So, a solution might be that AI systems must be required to explain how they arrived in a solution as it might be the only way we can feel assured that systems beyond our human capabilities are making decisions in our best interest. Also, all AI systems must be developed with a set of laws that ensures no harm is done to any humans at any cost.

Still, the question arises:

If we are no longer the smartest, are we "guaranteed" to stay in control?



Did You Know?

>> 92% of the world's currency exists only on computers.

>> 80% of emails sent daily are spam mail.

AIoT



Sivani K J
S6 CSE

Individually, the Internet of Things (IoT) and Artificial Intelligence (AI) are captivating. The amalgamation of AI and IoT, known as the Artificial Intelligence of Things (AIoT), holds even more potential to transform the future of the corporate world.

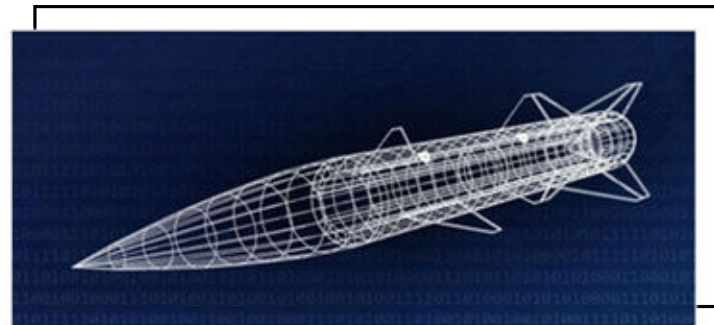
What is AIoT?

Artificial Intelligence of Things (AIoT) refers to the idea of integrating AI capabilities into an IOT device to form an intelligent and connected system. Here, IoT represents the sensory organs and AI acts as the brain of the system. When “things” such as wearable devices, refrigerators, digital assistants, sensors and other equipment are connected to the internet, can be recognized by other devices and collect and process data, you have the internet of things. Artificial intelligence is when a system can complete a set of tasks or learn from data in a way that seems intelligent. With the integration of AI in IoT, a network of connected devices turns into an intelligent machine where it not only knows how to learn and react but also knows how to improvise. Organizations can leverage AIoT’s capabilities to transform their business processes, drive digital transformation, and ultimately take a leap towards modernization.

Industries benefiting from AIoT

Digital Twins

Digital Twins as the name indicates are twin objects where one is a real-world object; the other is its digital replica. Airplane engines and wind turbines use Digital Twins to analyze the performance of the objects without the need of using the traditional testing methods thereby minimizing the costs required for testing.



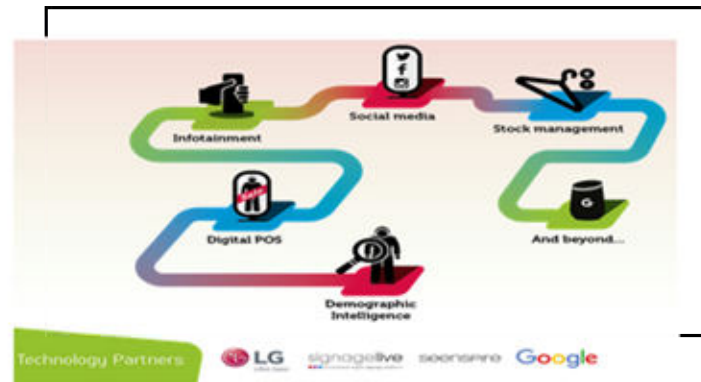
Smart Cities

With the help of a network of sensors attached to the physical city infrastructure, various factors like pollution, water usage/wastage, energy efficiency, traffic conditions, etc. can be monitored and changes are made accordingly to make the cities smart. Smart buildings have connected cameras and artificial intelligence that can compare images taken in real-time against a database to determine who should be granted access to a building and have sensors to adjust temperatures and lighting accordingly to improve energy efficiency is AIoT at work.



Smart Retailing

Artificial Intelligence and the Internet of Things are used together by retailers for understanding customer behavior by studying the consumer's profile online, checking the in-store inventory, etc. Thereafter, real-time personalized offers are sent to the customer while the customer is in the store like what happens in the Amazon Go store.



Drones

The possible future of drones is in the drone delivery ecosystem. Drones are aircraft without a human pilot. The drones are operated by software and they are used for navigating the unknown surroundings and places that are beyond the reach of the Internet. Also, it can be made to reach places like war zones, mines, burning buildings, etc. that are hazardous for humans. Drones are deployed to traffic monitoring, they can transmit traffic data, and then AI can analyze the data and make decisions about how to best alleviate traffic congestion with adjustments to speed limits and timing of traffic lights without human involvement.



Autonomous Delivery Robots

Similar to how AIoT is used with autonomous vehicles, autonomous delivery robots are another example of AIoT in action. Robots have sensors that gather information about the environment the robot is traversing and then make moment-to-moment decisions about how to respond through its onboard AI platform.



Why AIoT?

Intelligent Decision Making

It is projected that in the coming years, there will be billions of connected devices and systems available and this will exponentially increase the data generated by IoT. In fact, by 2020, the amount of internet data is expected to reach 44 zettabytes. AIoT can help enterprises to intelligently manage this overwhelming data in a way that Complex algorithms allow performing predictive analytics from all conceivable angles. Machine learning (ML), a subset of AI, continues to upgrade workflows and simplify problem-solving.

Increased Operational Efficiency

The fusion of AI and IoT helps organizations increase the efficiency of their operations through smart automation. The Hershey Company is a great example of implementing the concept of AIoT to optimize operations. For Hershey, efficient weight management is one of the most crucial tasks. They save around \$500,000 for a 14,000 gallon batch of Twizzlers for every 1% improvement in weight precision. With AIoT, Hershey is able to reduce weight variability in production to minimize the utilization of 240 process adjustments a day.

Prediction Accuracy

With the power of AIoT, organizations are able to predict operation outputs more accurately. The best example for this case is Tesla's autopilot system. It integrates GPS, cameras, sonars, and forward-looking radars with specialized hardware to best utilize the data coupled into the neural network architecture. The intelligent system is able to determine what should be the next change in the movement of the car.

Another example is of Google. They have cut down 40% of their data center cooling costs through accurate prediction. Data collected from the sensors deployed in the facility is used to predict the pressure and temperature over the subsequent hour to reduce power consumption.

Customer Delight

Today, data captured from IoT devices provide organizations numerous opportunities to connect with their customers and that too in new ways. When this data is combined with AI, the outcome is even more powerful. Deeper customer intelligence can be achieved and an agile, targeted, and effective customer experience strategy can be created. At a retail store, IoT-driven cameras can be used to scan the store and determine customer emotions and behavior. AIoT helps organizations promote learning and personalization at the same time. They are able to treat every customer individually, considering habits, patterns, and preferences.

AIoT is Transforming the Corporate World

The concept of AIoT is still relatively new, organizations that implement AIoT applications will become more diverse and have an edge over their competition, as they will be fueled with the ability to make intelligent decisions, optimize operations, improve predictions, and provide significant value to their customers. The future of industrial automation lies in the convergence of AI and IoT. Artificial Intelligence of Things will impact almost every industry including automotive, aviation, finance, healthcare, manufacturing and supply chain.



Did You Know?

>> Over 5000 new computer viruses are released every month.

>> The first hard drive could only hold 5MB of data.

INTELLIGENT BASKET



Dr. REMYA K SAI
HOD

Intelligent basket is a future technological concept that is going to revolutionize the purchasing experience of every buyer. Imagine how happy we would be if someone can deliver the weekly essentials at our doorsteps, without even worrying about building the online shopping cart too.

Purchasing and shopping at big malls is becoming daily activity in metro cities. We can see big rush at these malls on holidays and weekends.

After completion of purchases, one needs to queue up in a billing counter for payments. At billing counter the cashier prepare the bill using bar code reader which is another time consuming process and results in long queue at billing counter. Once purchase is over, carrying all the shopping things and reaching home is another tiring process. In rural areas people purchase daily house essentials from different stores. For a busy person, the precious time to spend with family is lost while shopping. Some people are not aware about the leftout items at home and buy things unnecessarily which leads to wastage of items and money.

The Intelligent basket is a system which uses artificial intelligence to predict the customers purchase behaviour of retail items. This model needs to be trained initially to learn the details of a family including number of members, gender, age, their food preferences and family purchase history.

Purchase history consists of their monthly household items bought including grocery, vegetables, milk, poultry, bakery etc, the quantity of each item and the frequency of purchase from a retail shop or locality. From this, the model is capable of predicting the possible future purchase of that customer. From the purchase history and customer family details intelligent basket can build an Automated Shopping Cart. Once the user approves the cart things are delivered at the customer doorsteps the very next day.

Once developed intelligent basket can be an innovative product that can attract high societal acceptance since it can assist a person in everyday shopping in terms of reduced time, comfort, convenience and efficiency.





മെഷീൻ ലേർണിംഗ്: ആർട്ടിഫിഷ്യൽ ഇൻ്റലിജൻസിലെ പുതുവസന്തം

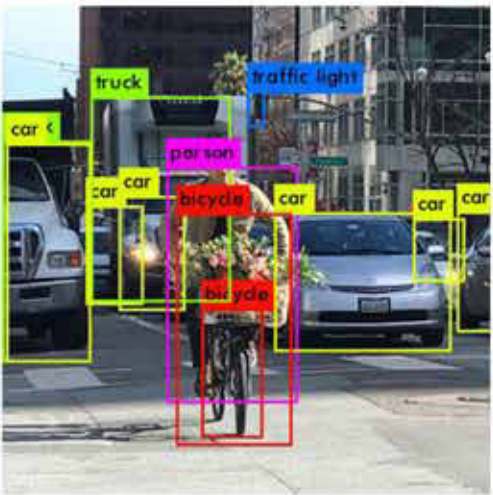


Prof. Achuthsankar S. Nair

Dept. of Computational Biology & Bioinformatics, University of Kerala

ആർട്ടിഫിഷ്യൽ ഇൻ്റലിജൻസ് എന്ന മേഖല നിലവിൽ വന്നിട്ട് ആറ് പതിറ്റാണ്ടിലധികമായി. കമ്പ്യൂട്ടറുകൾക്ക് മനുഷ്യബുദ്ധി കൃത്യമായി നൽകാനുള്ള ശ്രമങ്ങൾ അരനൂറ്റാണ്ടുകാലത്തോളം ശൈശവ ദശയിൽ തന്നെയായിരുന്നു. എന്നാൽ കഴിഞ്ഞ ഒരു പതിറ്റാണ്ടിൽ ഈ മേഖലയിൽ ഒരു കുതിച്ചുചാട്ടം ഉണ്ടായിരിക്കുന്നു. മെഷീൻ ലേർണിംഗ് എന്ന ഉപമേഖല വളരെ പെട്ടെന്ന് വളർന്ന് പന്തലിച്ച് ദൈനംദിന ജീവിതത്തിൽ അനുരണനങ്ങൾ സൃഷ്ടിച്ചിരിക്കുന്നു. ഒരു പക്ഷേ എറ്റവും പെട്ടെന്ന് ചുണ്ടിക്കാണിക്കാവുന്നത് മുഖം തിരിച്ചറിയാൻ (face recognition) തന്നെ.

മൊബൈൽഫോണിൽ വിരലടയാളത്തിനുപകരം ഉടമയുടെ മുഖം നോക്കി പ്രവേശനം അനുവദിക്കുന്ന സംവിധാനവും സോഷ്യൽ മീഡിയയിൽ ചിത്രങ്ങൾ പോസ്റ്റ് ചെയ്യാൻ ശ്രമിക്കുമ്പോൾ ഞൊടിയിടയിൽ കൂടെ നിൽക്കുന്നവരെ എല്ലാം തന്നെ തിരിച്ചറിഞ്ഞ് അവരെ ടാഗ് ചെയ്യാൻ നിർദ്ദേശിക്കുന്നതും ഈ സാങ്കേതികവിദ്യയുടെ മികവുകൊണ്ടുതന്നെ. നമ്മുടെ നാടിനെ കഴിഞ്ഞ വർഷം ഇളക്കി മറിച്ച ശബരിമല യുവതി പ്രവേശന തർക്കത്തിന്റെ വേളയിൽ ക്രിമിനലുകൾ കടന്നു കയറി പ്രശ്നമുണ്ടാക്കാതിരിക്കാൻ ഇരുന്നൂറോളം ക്രിമിനലുകളുടെ മുഖം തിരിച്ചറിയാൻ സജ്ജമാക്കിയ മുഖം തിരിച്ചറിയാൻ ക്യാമറകൾ (face detection cameras) കേരളാ പോലീസ് വിന്യസിച്ചിരുന്നു. ഒരൽപ്പം ചരിഞ്ഞും തിരിഞ്ഞും അകന്നുമൊക്കെ നിന്നാലും ക്യാമറ ആളെ തിരിച്ചറിയുമ്പോൾ, പകരം കൺട്രോൾ റൂമിൽ ലഭ്യമായ CCTV ദൃശ്യങ്ങൾ പോലീസുകാർ കണ്ണിലെണ്ണയുമൊഴിച്ച് ദ്രോഹമായി പറയുന്നത് ആലോചിച്ച് നോക്കിയാൽ നമുക്ക് മനസ്സിലാകും ഇത്തരം സാങ്കേതികവിദ്യ നൽകുന്ന മൂല്യം. മുഖം മാത്രമല്ല കാണുന്ന ദൃശ്യത്തിലെ ഓരോ ജീവിയേയും വസ്തുവിനെയും തിരിച്ചറിയുന്ന തലത്തിലേക്ക് Recognition സോഫ്റ്റ് വെയറുകൾ എത്തിയിരിക്കുന്നു.



എന്തുകൊണ്ട് പുതുവസന്തം

ആറ് പതിറ്റാണ്ടിലേറെയായി നിലനിന്നിരുന്ന ഒരു സാങ്കേതികജ്ഞാനം പെട്ടെന്ന് ഗവേഷണത്തിന്റെ ദന്തഗോപുരം വിട്ട് ജനങ്ങൾക്കിടയിലേയ്ക്ക് കിറങ്ങി വരാൻ കാരണമെന്തെന്ന് സ്വാഭാവികമായും ഏവരും ചോദിക്കാം. ഒന്നിലേറെ കാരണങ്ങൾ അതിന് നൽകാനാകും.

>> കമ്പ്യൂട്ടർ ഹാർഡ് വെയറിൽ ഉണ്ടായ വികാസങ്ങൾ: ഇജഡ വിനോദം ഏജഡ (Graphic Processing Unit) സർവ്വസാധാരണമാകുകയും അവ CPUമായി സഹകരിച്ച് ഗ്രാഫിക് മാത്രമല്ല ഗ്രാഫിക്കേതര പ്രോസസ്സിംഗിലും സാധ്യമാക്കിയിട്ടുള്ള വമ്പൻ മെച്ചപ്പെടുത്തലും ആണ് ഒന്നാമത്തെ കാരണം. ദിവസങ്ങളും മാസങ്ങളും നീണ്ടുനിന്ന മെഷീൻ 'ലേർണിംഗ്' ഞൊടിയിടയിൽ ഇന്ന് ചെയ്യാൻ കഴിയുന്നതുകാരണമാണ് ഈ രംഗത്ത് കുതിപ്പ് ഉണ്ടായത്.

>> ബിഗ് ഡേറ്റാ ലഭ്യത : സാമൂഹ്യമായുള്ള ഫെയ്സ്ബുക്ക്, ട്വിറ്റർ, യൂട്യൂബ് എന്നിവയിൽ നിന്നുമുള്ള വമ്പൻ ഡേറ്റാ ലഭ്യത കമ്പ്യൂട്ടർ സംവിധാനങ്ങളെ പരിശീലിപ്പിച്ച് എടുക്കാനുള്ള സാധ്യതയെ ഏറെ വർദ്ധിപ്പിച്ചിരിക്കുന്നു. സെക്യൂരിറ്റി ക്യാമറകൾ, മൊബൈൽഫോണുകൾ, ഗൂഗിൾ എന്നിവ മനുഷ്യ ജീവിതത്തിന്റെ ഏറെ പ്രവർത്തനങ്ങളെ ഡിജിറ്റലായി രേഖപ്പെടുത്തിക്കൊണ്ടേയിരിക്കുന്നു. ഇവയെ നാം അപഗ്രഥിച്ച് 'പഠിച്ച്' പല മനുഷ്യ വൈഭവങ്ങളും യന്ത്രങ്ങൾക്ക് സ്വായത്തമാക്കാം

>>മനുഷ്യന്റെ തലച്ചോറിന്റെ ഘടനയും പ്രവർത്തനവും മാതൃകയാക്കി Artificial Neural Network (ANN) രംഗത്ത് ഉണ്ടായ അനേകം ചെറിയ ചെറിയ മെച്ചപ്പെടുത്തലുകളുടെ കൂട്ടായ ഫലം അവയെ ശക്തമാക്കി. Convolution Neural Network (CNN) എന്ന പുതിയ വികാസം ഈ മെച്ചപ്പെടുത്തലുകളെ കൈസന്നിവേശിപ്പിക്കുകയും Convolution Layer എന്ന വിപ്ലവകരമായ ഒരു ആശയം കൂടി നടപ്പിലാക്കുകയും ചെയ്തു. യുക്തിപരമായി ഡേറ്റയെ അപഗ്രഥിച്ച് അതിന്റെ കാര്യമാത്രപ്രസക്തമായ അംശങ്ങൾ ലേണിംഗിനായി ഉപയോഗിക്കുന്ന രീതി (Feature extraction) അപ്രസക്തമാക്കിക്കൊണ്ട് ഡേറ്റ നേരിട്ട് (Raw Data) ലേണിംഗിനായി നൽകാനാകുന്ന രീതി CNN പ്രചാരത്തിലാക്കി.

>> മുൻകൂറായി ലേണിംഗ് നടത്തിയ മെഷീൻ ലേണിംഗ് മാതൃകകൾ ഇപ്പോൾ ലഭ്യമാണ്. ഉദാഹരണത്തിന് മുഖം തിരിച്ചറിയാൻ വേണ്ടി ആയിരക്കണക്കിന് മുഖങ്ങൾ കാണിച്ച് പരിശീലിപ്പിച്ച മെഷീൻ ലേണിംഗിന്റെ മാതൃക ലഭ്യമായാൽ അതിൽ നമ്മുടെ മുഖം ചേർക്കാൻ താരതമ്യേന എളുപ്പമായിരിക്കും. Feature extraction ന് ഓട്ടോമാറ്റിക്കായി നടത്തുന്ന കോൺവല്യൂഷൻ ഭാഗം ഇതിനകം തന്നെ മുഖം തിരിച്ചറിയാൻ Feature extraction പഠിച്ചു കഴിഞ്ഞിരിക്കുന്നതിനാൽ നമ്മുടെ മുഖം പഠിച്ചെടുക്കാൻ ചെറിയ മാറ്റങ്ങളെ ആവശ്യമുള്ളൂ. ഈ രീതിയെ ലേർണിംഗ് എന്നാണ് പറയുന്നത്.

>>മെഷീൻ ലേണിംഗ് നടപ്പിലാക്കാൻ അനേകം ശക്തമായ പാക്കേജുകൾ ലഭ്യമാണ്, ഇവയിൽ മിക്കവയും ഓപ്പൺ സോഴ്സ് ആണെന്നതും ഈ രംഗത്തെ സജീവ വികസനത്തിന് കാരണമായിട്ടുണ്ട്. മിക്ക പാക്കേജുകളും പൈത്തൺ പ്രോഗ്രാമിംഗ് ഭാഷയുടെ ഭാഗമായി പ്രവർത്തിക്കുന്നവയാണ്. Tensorflow, Scikit, Theano എന്നിങ്ങനെ ഒട്ടനേകം പാക്കേജുകൾ ലഭ്യമാണ്. ഇവയൊക്കെത്തന്നെ സങ്കീർണ്ണമായ മെഷീൻ ലേണിംഗ് ഘട്ടങ്ങൾ ഒറ്റ ഫംഗ്ഷൻ കോളുകളാൽ നടപ്പിലാക്കാൻ പാകത്തിലുള്ളവയാണ്. യഥാർത്ഥത്തിൽ ഇന്ന് ML മാതൃകകൾ വികസിപ്പിക്കുന്നവർ ഗഹനമായ പ്രോഗ്രാമിംഗ് ചെയ്യുകയല്ല, എന്താനും ഫംഗ്ഷണൽ കോളുകൾ നടത്തുകമാത്രമാണ് ചെയ്യുന്നത്, അതായത് വിദഗ്ദ്ധ പ്രോഗ്രാമർമാരെല്ലാവർക്കും മെഷീൻ ലേണിംഗ് ഉപയോഗിക്കുക സാധ്യമാണ്.

അടിസ്ഥാന ആശയം

മെഷീൻ ലേണിംഗിൽ വിവിധതരം സംവിധാനങ്ങളുണ്ടെങ്കിലും ഇപ്പോൾ അതിന്റെ കേന്ദ്ര ആകർഷണം നൂതന ആർട്ടിഫിഷ്യൽ ന്യൂറൽ നെറ്റ് വർക്കുകൾ തന്നെയാണ്. ആർട്ടിഫിഷ്യൽ ന്യൂറൽ നെറ്റ് വർക്കിന്റെ (ANN) അടിസ്ഥാന തത്വം അതിനാൽ ഏറ്റവും ലളിതമായി മനസ്സിലാക്കിക്കേണ്ടതുണ്ട്.



എറ്റവും ലളിതമായി പറഞ്ഞാൽ ഒരു ANN ഇൻപുട്ടിനെ നമുക്ക് ആവശ്യമുള്ള ഔട്ട്പുട്ടായി മാറ്റാൻ വേണ്ടുന്നത് 'പഠിച്ചെടുക്കുന്ന' ഒരു സംവിധാനമാണ്. ഇനിയും നിസ്സാരവൽക്കരിച്ചാൽ അതിന് ഒരു സംഖ്യ നൽകി നാം ആഗ്രഹിക്കുന്ന അതിനെ മാറ്റാൻ കഴിയുന്ന ഒരു സമവാക്യമാണ് ANN എന്നുപറയാം.

X ഇൻപുട്ടും Y ഔട്ട്പുട്ടും ആണെങ്കിൽ നമുക്ക് എറ്റവും നിസ്സാരമായ ഒരു ANN സൃഷ്ടിക്കാൻ ഒരു ലളിത സമവാക്യം മതി

$$x \rightarrow (W) \rightarrow y \rightarrow y=Wx$$

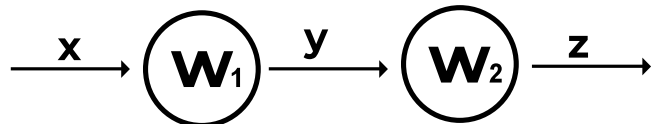
5 എന്ന ഇൻപുട്ട് 10 എന്ന ഔട്ട്പുട്ടായി മാറ്റാൻ അച്ഛന് കഴിയണമെങ്കിൽ $W= 2$ എന്നറിഞ്ഞാൽ മതി. ഓരോ x, y ബന്ധത്തിനും ഉതകുന്ന W കണ്ടെത്തുന്നതിനെയാണ് 'പഠനം' (Learning) എന്നുപറയുന്നത്.

നമ്മുടെ നിസ്സാര ഉദാഹരണത്തിൽ W കണ്ടെത്തൽ ലളിതവും വ്യക്തവുമാണെങ്കിലും ഇത് ഓട്ടോമാറ്റിക്കായി കണ്ടെത്താൻ കഴിഞ്ഞാൽ കൂടുതൽ സങ്കീർണ്ണമായ വേളകളിൽ ഇത് ഉപയോഗിക്കാൻ കഴിയും. ഇതിന് നമ്മളെ സഹായിക്കുന്ന അൽഗോരിതമാണ് 'Gradient descent' അൽഗോരിതം. അൽഗോരിതത്തിന്റെ വിശദാംശങ്ങളിലേക്ക് പോകാതെ അതുപയോഗിച്ച് $y=Wx$ ലെ W ന്റെ മൂല്യം പടിപടിയായി കണ്ടെത്താൻ നമുക്ക് ഒരു സമവാക്യം ഉപയോഗിക്കാം എന്നുമാത്രം ഇവിടെ സൂചിപ്പിക്കാം. W ന്റെ മൂല്യം എന്തെങ്കിലും സംഖ്യയായി സങ്കൽപ്പിച്ചുകൊണ്ട് $y=Wx$ നമ്മുടെ ആഗ്രഹാനുസരണം വരുമ്പോ എന്ന് നോക്കുകയും വന്നില്ലെങ്കിൽ Wന്റെ മൂല്യം മാറ്റിനൽകാൻ താഴെ പറയുന്ന ഫോർമുല ഉപയോഗിക്കുകയുമാണ് നാം ചെയ്യുന്നത്.

Iteration	മുൻപു് $W_{(x)}$	$W_{(y)}$	മുൻപു് y $W_{(x)} \cdot x$	$W_{(y)} = W_{(x)} + 0.25 - 0.05y$
1	5	0.46 (randomly chosen)	1.0	0.7
2	5	0.7	1.5	0.78
3	5	0.78	1.54	0.83
4	5	0.81	1.54	0.87
5	5	0.87	1.75	0.90
6	5	0.90	1.81	0.93
7	5	0.93	1.87	0.94
8	5	0.94	1.91	0.95
9	5	0.95	1.91	0.96
10	5	0.96	1.91	0.97
11	5	0.97	1.91	0.98
12	5	0.98	1.91	0.98
13	5	0.99	1.91	0.99

$$W_{(y)} = W_{(x)} + 0.25 - 0.05y$$

ഏതാനും തവണകൾ കൊണ്ട് 5 എന്ന ശരിയായ മൂല്യത്തിലേക്ക് എത്തിച്ചേരുന്നത് താഴെക്കാണുന്ന പട്ടികയിൽ നിന്നും വ്യക്തമാണ്. മേൽ സൂചിപ്പിച്ച സംവിധാനത്തെ ഒന്നുകൂടി സങ്കീർണ്ണമാക്കിയാൽ രണ്ട് 'ലെയർ' ഉള്ള ഒരു ANN ഉണ്ടാകാനാകും.

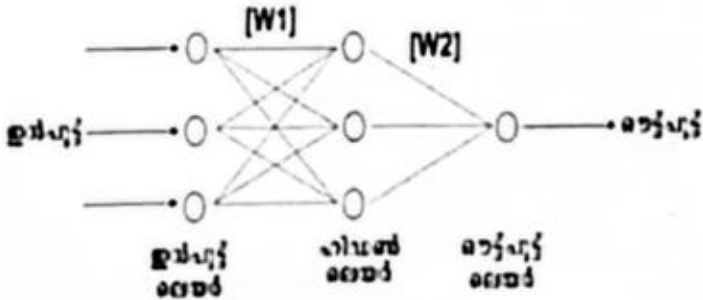


ഇതിൽ $W1, W2$ എന്നീ മുല്യങ്ങൾ എന്ത് X മുല്യത്തെയും നമ്മൾ ആഗ്രഹിക്കുന്ന ഏത് Z മുല്യമായും മാറ്റാൻ കഴിയും. ഇതിന് ഗ്രേഡിയന്റ് ഡിസന്റ് അൽഗോരിതം ഉപയോഗിച്ച് $W1, W2$ എന്നീ മുല്യങ്ങൾ മുൻ ഉദാഹരണത്തിലേതുപോലെ ആവർത്തിച്ചുള്ള കണക്കുകൂട്ടലിലൂടെ കണ്ടെത്താൻ കഴിയും.

മൾട്ടിലെയർ പെർസെപ്ട്രോൺ.

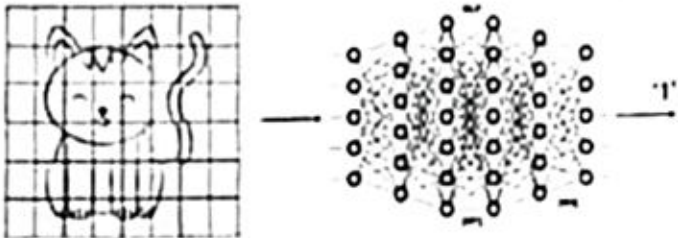
യഥാർത്ഥ ANN എങ്ങനെയാണെന്ന് ഇനി നമുക്ക് നോക്കാം. തലച്ചോറിന്റെ ന്യൂറോൺ കോശങ്ങൾ എങ്ങനെ ക്രമീകരിച്ചിരിക്കുന്നു എന്നതിൽ നിന്ന് പ്രോത്സാഹനം ഉൾക്കൊണ്ടാണ് Multilayer perceptron (MLP) എന്ന ഈ മാതൃക സൃഷ്ടിച്ചിരിക്കുന്നത്, എന്നാൽ ഈ സാധ്യത്വം ഏറെ പരിമിതമായതിനാൽ തലച്ചോറിന്റെ പ്രവർത്തനമൊന്നും നാമിവിടെ പരാമർശിക്കുന്നില്ല. MLP യുടെ ഘടനയും പ്രവർത്തനവും നമുക്ക് നേരിട്ട് വിശദീകരിക്കാം.

ലളിതമായ കണക്കുകൂട്ടലുകൾ നടത്തുന്ന നോഡുകൾ പല ലെയറുകളിലായി ക്രമീകരിച്ചാണ് MLP സൃഷ്ടിക്കുക. കുറഞ്ഞത് 3 ലെയറുകളാണ് ഇവയിൽ ഉണ്ടാകുക.

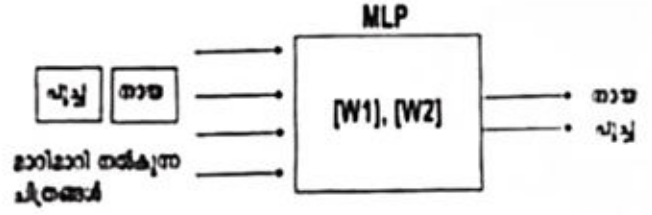


നേരത്തെ സൂചിപ്പിച്ച ലളിത ഉദാഹരണവുമായി ഇതിനുള്ള സാമ്യം നോക്കൂ. ഇൻപുട്ട് ഒന്നിലധികം ഉണ്ട്. $W1, W2$ എന്നീ മുല്യങ്ങൾ ഇവിടെ ഒരു കൂട്ടം ഉണ്ട്. ഓരോ നോഡുകളിൽ നിന്നും മറ്റു നോഡുകളിലേയ്ക്ക് ബന്ധിപ്പിച്ചിരിക്കുന്ന 'കണക്ഷനുകൾക്ക്' വെയ്റ്റുകൾ നിർവ്വചിച്ചിട്ടുള്ളതിനാൽ $W11, W12, W13, W21, W22, W23, W31, W32, W33$ എന്നിങ്ങനെ വെയിറ്റ് കണക്കിനെ ലടുകേണ്ടിവരും. ഇവയെ ഗണിതശാസ്ത്രത്തിലെ മാട്രിക്സ് എന്ന രൂപത്തിൽ $[W1], [W2]$ എന്ന് നാം പരാമർശിച്ചാൽ മുൻ ഉദാഹരണവുമായുള്ള സാമ്യം വ്യക്തമാകും. അതായത് ഇൻപുട്ട് നൽകുകയും അത് $[W1], [W2]$ എന്നിവകൊണ്ട് ഗുണിച്ച് ഔട്ട്പുട്ട് ഉണ്ടാക്കുകയും അത് നമ്മൾ ആഗ്രഹിച്ചപ്രകാരമല്ലെങ്കിൽ $[W1], [W2]$ എണ്ണം എന്നിവയുടെ മുല്യം തിരുത്തുകയും ചെയ്തു കൊണ്ടിരിക്കണം. ഇതിനായി Back propagation അൽഗോരിതം ലഭ്യമാണ്. അതായത് ഏത് ഇൻപുട്ടും ഏത് ഔട്ട്പുട്ടുമായി മാറ്റാൻ നമുക്കാകും.

ഒരു പുച്ചയുടെ ചിത്രത്തിലെ പിക്സലുകൾ ഇൻപുട്ടായി നൽകി ഔട്ട്പുട്ട് 1 എന്നാക്കത്തക്കവണ്ണം $[W1], [W2]$ കണ്ടെത്തിയാൽ MLP പുച്ചയെ തിരിച്ചറിയാൻ 'പഠിച്ചു' എന്ന് നമുക്ക് കരുതാം.



നായയുടെയും പുച്ചയുടെയും ചിത്രങ്ങളിലെ പിക്സലുകൾ മാറി മാറി നൽകി $[W1], [W2]$ കണ്ടെത്തിയാൽ പഠനം മുന്നേറി എന്നു പറയാം. ഔട്ട്പുട്ടിൽ രണ്ട് നോഡ് വേണ്ടി വരും.



ഡേറ്റയിൽ നിന്ന് ഫീച്ചറുകൾ

ചിത്രങ്ങൾക്കു പകരം ഡേറ്റയും (സംഖ്യകളാക്കി മാറ്റിയാൽ) MLP യ്ക്ക് സ്വീകരിക്കാൻ കഴിയും. പഠിക്കാനായി സമ്പൂർണ്ണ ഡേറ്റ ആവശ്യമില്ല. മുഖം തിരിച്ചറിയുന്ന സംവിധാനങ്ങളിൽ മുഖത്തിന്റെ മുഴുവൻ പിക്സലുകൾക്ക് പകരം തിരിച്ചറിയാൻ സാധിക്കുന്ന ചില സവിശേഷവിവരണങ്ങൾ മാത്രം മതി. മുഴുവൻ ചിത്രത്തിൽ നിന്നും കണക്ക് കൂട്ടിയെടുക്കുന്ന, പഠനത്തിന് അത്യാവശ്യമായ വിവരങ്ങളെ Features എന്നാണ് പറയുക. സാധാരണയായി ഇത് ഗവേഷണത്തിലൂടെ കണ്ടെത്തുന്ന വിവരങ്ങളാണ്. മുഖം തിരിച്ചറിയൽ സംവിധാനങ്ങളിൽ 72 ലാസ്റ്റ് മാർക്ക് പോയിന്റുകളാണ് ഫീച്ചറുകളായി ഉപയോഗിക്കുന്നത്.



അതുപോലെ ജോലിയ്ക്ക് തിരഞ്ഞെടുക്കാൻ ബയോഡേറ്റയിൽ നൽകിയിരിക്കുന്ന ഒട്ടനേകം വിവരങ്ങളിൽ നിന്നും (രക്തഗ്രൂപ്പ്, ജാതി, മതം, ഉയരം, ഭാരം, ജനന തീയതി, ജനിച്ച പ്രദേശം, മാർക്ക്, പ്രവർത്തിപരിചയം) എത്രാനും എണ്ണം മാത്രം (ഉദാ: മാർക്ക്, പ്രവർത്തിപരിചയം) ആധാരമാക്കുന്നതും ഒരു ലളിത ഫീച്ചർ തിരഞ്ഞെടുക്കുന്നതിന് ഉദാഹരണമാണ്.



Did You Know?

>> Creeper, written by Bob Thomas in 1971, is the first computer virus.

SIR, PERMISSION TO LIT THE SPARK.....!!!

Ideas grow better when transplanted into another mind than the one where they sprang up, that is what we call "Techable". Techable is an android application that we have developed to assist the Deaf. It seems to be a shaggy-dog story when you come to know that it was developed by five girls without any technical cognizance. But with all the confusion set aside, we had a great couple of years learning, growing using various online materials.

Our journey through our project Techable is really an unexpected one. But we were proactively engaged in various projects from the beginning of our undergraduate program. Because we believe academics alone can't feed our knowledge. Only practical knowledge and hands-on experience through projects can increase our calibre. We were put together and had a brainstorming all of a sudden, neither our theoretical knowledge nor our practical knowledge put forth to form a group. After listing the pros and cons of various ideas that came across, we were enlightened to move forward with Techable.

We could still reminisce our first competition, **Idea Fest 2019** and we were the finalists. It was the perfect opportunity to analyze our theory. As we were lacking information about deaf children, whether our app acceptable to deaf children was the query raised by the panel of judges. Hence we were advised to visit some deaf schools which brought us to, Asha



Team TECHABLE

Rose Armstrong, Rosemary Josheph, Rosemary Martin, Drishya R, Grace M L

Bhavan at Ollur. Even the simple act of roping us with that popular deaf school in Thrissur was a major chore. There we got a positive response which boosted us to move forward with this project and helped us to find the exciting opportunity that we have to endeavour in their studies. It was remarkable, as well as valuable experience.

With that, we stepped up for a new competition, **Kerala Social Impact Challenge 2019** where we were once more selected as finalists. The guidance from there was a turning point, as we were redirected to visit the National Institute of Speech and Hearing (NISH) for further clarification. There we got in contact with Raji N R, H R at NISH. In favour of the idea we had put she felt we and DCB (Dept. Of Computational biology and bioinformatics, Kerala University Trivandrum) getting together might produce some positive results and encouraged our earnest involvement. That was little more that she could do at the moment and DCB turned into a simple twist of the story. We got the priceless offer to move for an internship with our own project. At DCB we found a group of magical scholars with a passion for success. Under the guidelines provided by Biji ma'am and Dr Achuthsankar sir one of the leading science correspondent, researcher and information technology expert in Kerala, we stepped into the world of machine learning. They were not only mentors above that

they had a deep power to understand the dreams of their students.

Our next journey was to become Participants in Dr.Pradeep P Thevannoor Innovation Awards simply PPTIA an International project Expo. From where we succeeded in building a prototype for our project. To be frank we were fairly overconfident. Our lack of preparation for the presentation was our bad mark. But still gained a lot from there.

Failure may be a blessing, definitely a lesson, never a life sentence thus the repeated setbacks headed us to become the State level winners of Young Innovators Programme(Y-IP). Our great blessing was that we got the panel of judges who knew our application needed the hour.

We trust success is the sum of small efforts that made us the first runner up of SRISHTI National level project exhibition and competition for the category -Best Computer Science project.

SIH result 2020 tells us that dream is not merely a word but an actually existing phenomenon. Dream, from the standpoint of our experience, is merely the relation that exists between the expression of someone's will and the execution of that will by others.

All our above achievements came to reality from our dreams and fueling by our mentor. It's only because of our mentor Antony sir, Asst. professor of the Computer Science department, Christ College of Engineering, who was giving constant support from the beginning till here, we could mould this. He was the one who made us focused on our goals and the one who motivated us at each platform we came through.

Rather than the achievements grabbed, we could gain contacts of various notable persons which we are still maintaining, as their blessings and judgements are the treasure that we have acquired during our spade-work. They are the ones who motivated us to chase perfection in our project and to catch excellence.

In between our goals we also had a lot of fun during our journeys to various competition spots. Like doing vlogs of our experience, eating bhaji, birthday celebrations, chasing the train at last minute, running from the first boggy to the last to find a seat in just 3 minutes and so on. But, except for these fleeting memories, the major charm was we could visit plenty of places and could enjoy the vibrancy of cultural life, the quality of natural landscapes and in joining the ends, there is inevitable support and encouragement of our parents. It was really hard for us to travel at night in train and bus to various places but we made it possible with the courage given by our mentor, parents and the whole Christ college faculties including our Principal and Director. We always bear in mind, our classmates who gave continuous support throughout the journey from terrible failures to success. The opinions given by each and every person for this project were taken into consideration. We remember all of them with the deepest gratitude.

The team Techable believes in continuous improvement rather than delayed perfection.

We let our passion to become our purpose. And we are still moving ahead...



Did You Know?

>> The first programmer in the world was a woman. Her name was Ada Lovelace and she worked on an analytical engine back in the 1,800's.

EMOTION BASED MUSIC PLAYER (Abstract)

Angel Shaju
Geethu M A
Chinju P Bijoy
Ansiya Noushad

Recent studies confirm that humans respond and react to music and that music has a high impact on a person's brain activity. People tend to listen to music based on their mood and interests. The human face is an important organ of an individual's body and it especially plays an important role in the extraction of an individual's behavior and emotional state. The facial expression can also be called a form of non-verbal communication.

This project focuses on creating an application to suggest songs for users based on their mood, by capturing facial expressions.

Here in our project, we are classifying our songs based on ragas. There are a lot of ragas, where each raga represents each emotion. Some of the ragas used for this project are Hansdhwani, Philu, Dhesh, Jog, etc. The music player itself selects

Once the emotion is recognized, the system suggests a play-list for that emotion, saving a lot of time for a user over selecting and playing songs manually. The difficulties in the creation of a large playlist according to the user's mood is reduced here as segregating the list of songs and generating an appropriate playlist based on an individual's emotional features is a very tedious, time-consuming, labor-intensive and a challenging task.





G SUITE CERTIFICATION



Chrislyne Pathrose
S2 CSE

A Google Cloud certification in G Suite signals to employers that you possess the digital skills to work collaboratively and productively in a professional environment. By earning the G Suite certification, one proves one's ability to complete common workplace activities using cloud-based tools to create and share documents, spreadsheets, presentations, and files. One demonstrates that one can communicate effectively with email and online meeting solutions. This exam verifies proficiency in key features of the G Suite platform like drive, Gmail, hangouts meet, docs, sheets, forms and slides. Previously this certification was only available to adult professionals. With the increase in classes focused on Google applications, it is now available for students. The G Suite certification measures a student's proficiency with Google applications to create professional-looking content and to collaborate with others.

1. Gain Confidence with Digital Learning Strategies and Google Tools.

And there is always something new to learn about Google tools! Even if you are an experienced G Suite user, you will learn something new, including new ways to use G Suite in the classroom. The more you know and use these tools, the more confident you will be in your own classroom and in teaching others.

2. Facilitate and Inspire Student Learning and Creativity.

The Google Certified Educator program isn't just about the technology; it is learning how to use these tools to facilitate meaningful learning experiences for your students.

3. Create a Paperless Classroom

Going paperless is easier said than done. G Suite tools can help you learn how to create a paperless classroom, and improve your digital workflow and grading.

4. Collect Data and Increase Feedback Loops

Assessment data is a critical part of any classroom! Using Google Forms and Google Sheets, you will learn how to collect all kinds of data from your students and improve feedback.

5. Learn How to Find Answers and Support

What do you do when you get stuck? Do you know who to ask for support? Do you know where to search? When you have questions, it's important to understand how to search the support centre, help forums, and find assistance when you need it

6. Increase Digital Citizenship and Digital Literacy Skills in the Classroom

Finding time to teach digital citizenship skills can sometimes feel impossible. G Suite offers many ways to support these skills and help you find practical moments to build this skill set with your students.

7. Increase Efficiency and Save Time

The number one complaint of most teachers is lack of time. What if technology could actually save you time? When you learn how to use digital tools to be a more efficient teacher, everyone wins!

8. Engage in Professional Growth and Leadership.

Are you a lifelong learner? You should be! That's part of a growth mindset and will help you learn and grow with your students.

9. Prove Your Skills.

Teachers have to learn so much, isn't it nice when you are recognized for your accomplishments? When you become a Google Certified Educator, you get a certificate and badge that proves you know your stuff!

10. Get the Badge and Join the Google Certified Family.

Share your badge in your email signature, your blog, or your website, and wear it proud. Google Certified Educators are part of an elite group, a family of teachers that share and grow together.

The G Suite certification exam consists of two parts. First, a multiple-choice exam must be completed. Then, they move onto the performance-based assessment.

Overall, the exam includes six sections that are each related to a specific application within G Suite: using Drive, using Gmail, using Hangouts Meet, working in Docs, working in Slides. Each section includes subsections that contain concepts and skills students which should be known when using the G Suite applications

The exam for the certification is the duration of 2 hours with a registration fee of \$75 .Academic pricing will be available to students and educators, including administrators. The exam is in English .There could be a remote test where the exam can be taken at home or office or the test could be taken at a testing centre. By earning the G Suite certification, you prove your ability to complete common workplace activities using cloud-based tools to create and share documents, spreadsheets, presentations, and files. You demonstrate that you can communicate effectively with email and online meeting solutions.



Did You Know?

>> Doug Engelbart invented the first computer mouse in around 1964 which was made of wood.

>> Every minute, 10 hours of videos are uploaded on YouTube



BEACH HACK

Beach Hack 2, the much-awaited sequel of the first-ever beach hackathon of South India was held on Feb 14,15 at Azhikode, Munnakal beach. This event conducted by CODE had students participating from all over South India. Beach hack was set to bring ingenious students to find an innovative solution to some of the problems we face in our society. We had 20 teams from prestigious institutions of India. The theme of the competition was agriculture. The Hackathon aimed to focus on problems faced in agriculture and to produce a technical solution for the same within a limited span of time. Beach Hack aimed to provide college students with insight and perspective on various problems we are facing and to help them to improve their critical and creative thinking.

The coding competition began at 11am on Feb 14th. The first round was a 24-hour hackathon to find the maximum solution for the problem statement given. Judges visited each team to encourage and support them. A gaming Hub was setup near the venue for the competitors, to cope up with the stress and pressure during the coding competition. On the first day of Hackathon, we conducted other games like Penalty shootout and Beach Volleyball. There was a huge participation for both the events and winners were awarded with cash prize. The dazzling lights and the decoration at the venue attracted a huge crowd. The Student Band presented a marvellous performance for the audience on the valentine's day.

On the second day, after the three rounds of evaluation, the coding competition ended at 11am. 10 out of 20 teams got shortlisted to the final round- the presentation. Each team got 10 minutes to present their solution. Soti technical manager Lijo Joseph and Agropark chairman Baiju Nedukarayil were the judges of the event. On the second day, a Treasure Hunt competition was organized for the students.



Kaipamangalam MLA E T Taison was the chief guest for the prize distribution ceremony. Executive director of Christ College of engineering Fr. John Palliakara, Joint Director Fr. John Payapilly, Principal Dr. Sajeev John, Manager of Christ Autonomous college Fr. Jacob Njerinjampily, HOD of Computer Science department Dr Ramya Sashi were also present for the ceremony.

Akhil Kumar KS, Vishnu Murali, Anand Ramesh, Jafar of Universal engineering college were the winners of the event. They developed a mobile application that provides farmers an interface to display the availability of their products, quantity, and price. This helps buyers to view the available items with the farmer and to book items in advance. Second prize was given to Justin John Mathew, Naveen Sreevalsan, John Mathew Koshi, Allen Henry, Sachin Vilas of Karunya Institute of Technology. Third prize was given to Christin Mathews, Abi M, Jithin Jose, James Joy, Thomas Terrance of Amal Jyothi engineering college.



3D PRINTING



ANITTA GEORGE
S2 CSE

The **3D printing** process builds a three-dimensional object from a computer-aided design (CAD) model, usually by successively adding material layer by layer, which is why it is also called **additive manufacturing**. The term "3D printing" covers a variety of processes in which material is joined or solidified under computer control to create a three-dimensional object, with material being added together (such as liquid molecules or powder grains being fused), typically layer by layer. In the 1990s, 3D-printing techniques were considered suitable only for the production of functional or aesthetic prototypes and a more appropriate term for it was rapid prototyping. As of 2019, the precision, repeatability, and material range have increased to the point that some 3D-printing processes are considered viable as an industrial-production technology, whereby the term **additive manufacturing** can be used synonymously with "3D printing".

One of the key advantages of 3D printing is the ability to produce very complex shapes or geometries, and a prerequisite for producing any 3D printed part is a digital 3D model or a CAD file.

In recent years, **3D printing** has developed significantly and can now perform crucial roles in many applications, with the most important being manufacturing, medicine, architecture, custom art and design.

3D printing processes are finally catching up to their full potential, and are currently being used in manufacturing and medical industries, as well as by sociocultural sectors which facilitate 3D printing for commercial purposes.



The aerospace industry has some of the highest standards in part performance. Aerospace parts must withstand extreme temperatures and chemicals while being subjected to repeated loading, all while remaining as light as possible. Individual part failures often result in full system failures on aircraft carrying lives and cargo — so failure is simply not an option. Since part precision is critical for aircraft, aerospace engineers have taken to 3D printing inspection tooling to reduce costs for low-volume parts.

Aerospace components have long been fabricated using traditional manufacturing methods such as forging. That method requires significant post-processing. 3D printing offers new alternatives. Laser-based additive manufacturing provides an alternative, single-step method for producing complex, multi-material, dense or porous, near-net-shape parts that often outperform their traditionally manufactured equivalents, offering enhanced properties.

3D printing company, Formally, is producing parts using a laser-based process because of its ability to create new advantageous shapes. Their technology is known as LMD (laser metal deposition). That's a method where you blow power and heat it with a laser. You build the part layer by layer. The first advantage of this process is the ability to achieve design features such as internal cooling chambers or multi-material components with two different metals in the same part. Those types of parts can't be created by traditional manufacturing methods.

The LMD process also reduces waste when using high-priced materials. In a part that is entirely titanium, the LMD process offers the advantage of efficiency. It's much more efficient with the material itself using LMD. Also, there's a lead-time advantage, since you don't have to go through a tooling process to get the geometry you need.

There are many parts in aerospace that are now being produced through the

LMD. LMD parts that were seeing in aerospace include sample rocket nozzle components. Other examples include a heat exchange component that's part of a rocket nozzle. The additive manufacturing geometry includes inlets in the wall that are for cooling.

Laser metal deposition is a generative manufacturing method for metals. Internationally, it is generally known as "laser metal deposition", abbreviated to LMD. People also talk about "direct metal deposition" (DMD) or "direct energy deposition" (DED). The process is easy to explain. The laser creates a weld pool on the component surface. Metal powder is automatically added via a nozzle. Beads that are welded together are formed, resulting in structures on existing base bodies or entire components. The process is used in industries such as the aviation and aerospace industry, energy technology, petrochemicals, the automotive industry, as well as medical technology. This means LMD technology can also be combined with laser welding or laser cutting.

Advantages of LMD :

1) Higher build rates

Laser metal deposition creates rough and very fine structures – both with high build rates in comparison to other additive processes

2) Material range

Several powder containers can be used in the process, which enables you to develop custom alloys to suit your requirements. Sandwich structures can be created by combining different materials

3) Flexibility

Laser metal deposition enables 3D structures to be applied to existing, uneven surfaces, meaning changes to geometry can easily be made.

BLOCKCHAIN



N S Ananda Krishnan
S4 CSE

Blockchain in cloud storage

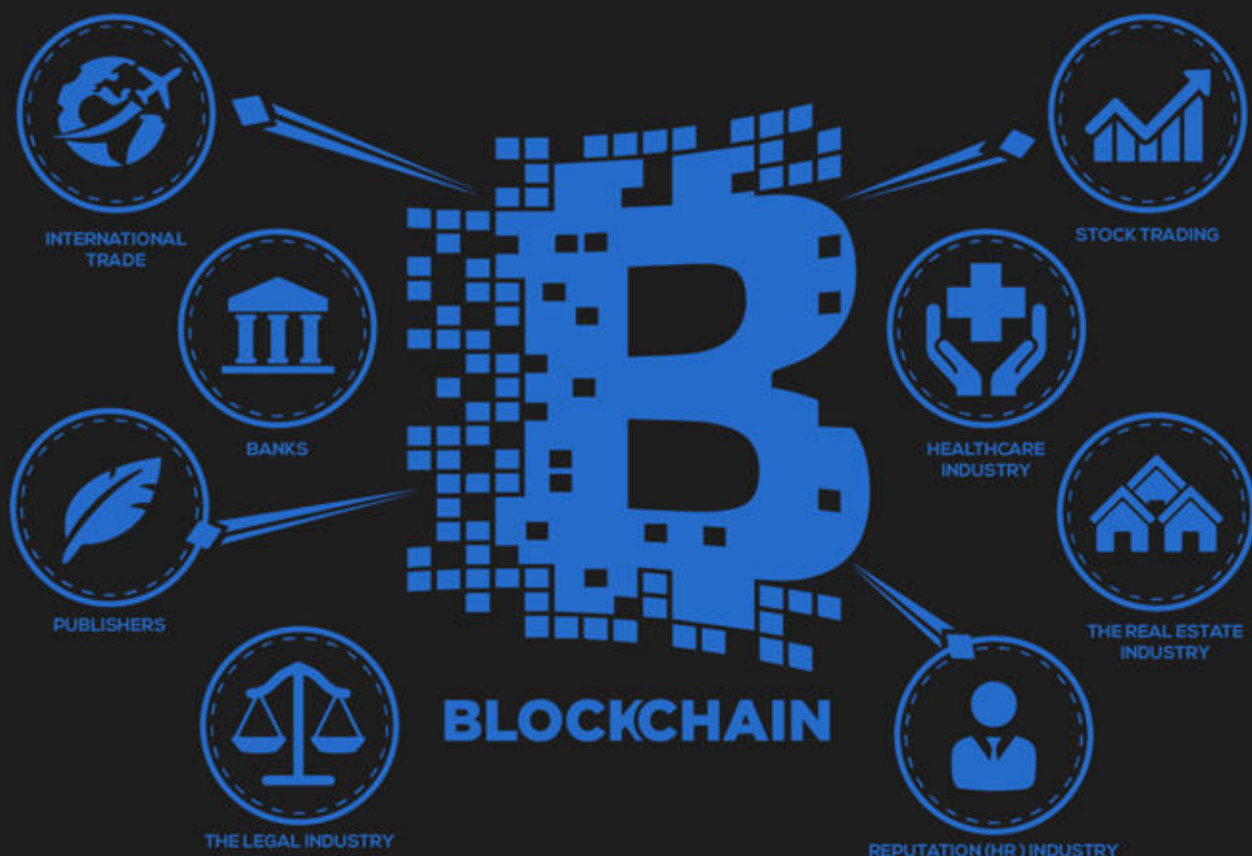
" The blockchain is an incorruptible digital ledger of economic transactions that can be programmed to record not just financial transactions but virtually everything of value. "

-Don and Alex Tapscott

Blockchain is one of the greatest inventions of today. You would have heard about the digital currency, cryptocurrency or Bitcoin. These are possible because of blockchain technology. In this article, we will first understand what blockchain technology is and how it works, and then we will look at how we can correlate cloud computing with blockchain technology.

The blockchain was invented in 2008 by a person or group of persons called Satoshi Nakamoto. To date, no one knows who Satoshi Nakamoto is, and whether he is a person or whether the name represents a group of people. Blockchain has evolved into something very powerful since then.

Blockchain technology is built using peer-to-peer networking. Anyone can join the network and there is no central authority to manage it. It is operated by people, called miners, who lend their computing power to the network to solve complex algorithms. Machines run by miners perform the necessary functions to solve the algorithms, and for that, they are rewarded with a fee (for lending their computing power). In the case of Bitcoin, that complex algorithm is SHA-256.



In a blockchain, each block stores the data of the transaction, its hash code and the previous block's hash code. So whenever a new block is created, it is validated by a majority of the peers or miners on that network. If anyone tries to change the data in one block, the entire blockchain will be invalidated; so it's nearly impossible for an individual to change all other attached blocks- and that's how a blockchain remains secure and managed. Also, all the data is encrypted for security purposes.

Bitcoin works on the same technology. It is a virtual currency that is mined using the blockchain technique and today, the value of one Bitcoin is 458,609. So, as you can imagine, it's virtually like gold. This blockchain technology is not just used for cryptocurrencies but can be used in many other sectors also. Potential use cases are video or audio streaming, cloud storage and much more. Today, a lot of research is going on to study how to tap the power of this technology and apply it across various verticals.

Cloud storage

Google Drive, Dropbox, Gmail, etc., are the basic examples of cloud storage. Cloud storage allows users to store their data online and hence access it anywhere and at any time - that's the biggest advantage. Nowadays, we store all data in the digital format, having moved beyond the stage of managing bundles of physical files. Government agencies are also leveraging the advantages of cloud storage and availing the benefits of public and private clouds to store, manage and manipulate data, All the data stored in the cloud is encrypted and cloud services are available under a range of SLAs, covering data integrity and privacy. Many companies have shifted their entire data center onto the cloud and enjoy advantages like elasticity, load balancing, redundancy, availability, and integrity. This market is expanding at an exponential rate, currently, with the majority of cloud storage being provided by large companies like Google, Microsoft, and Amazon. You may have observed that even mobile companies like Samsung and Apple now have their cloud storage offerings, such as Samsung Cloud and iCloud, for end-users.

Blockchain in cloud storage

Blockchain cloud storage solutions take the user's data and break it up into small chunks. They then add a layer of security and distribute it throughout the network. This is possible using blockchain features like the hashing function, public/private key encryption and transaction ledgers. Each chunk of data is stored in a decentralized location, if intruders try to hack into it, they first get encrypted data, and then get only a chunk of the data and not the whole file-this secures documents in blockchain-based cloud storage.

Another benefit is that the owner is hidden since the node does not store the owner's data. The miner only gets a chunk of data; hence, all the sensitive information is protected and secured. Data redundancy and load balancing mechanisms are applied for high availability and quick access Whenever a user tries to fetch data, all chunks of the data are first validated and if any alteration is found on a data chunk, then the miner who altered the data chunk is removed from the network, and that altered part is taken from another redundant copy. Thus, all users get original and identical copies of the data.

Many new companies have jumped into this new blockchain cloud storage market and the entire business is taking on a new shape. Blockchain is the newest and possibly the cheapest way to get cloud storage because many small entities participate in cloud storage by providing their computing power and space to store data. Hence, cloud storage costs are lowered and all the entities that participate can also get paid.

Companies like Sia, Amazon, and Storj are creating systems for paying a small amount to such participants for providing extra storage from their computers. So, shortly, we can see many more cloud storage providers moving to this technology. In the coming articles, we will talk about blockchain-based cloud applications and how to create your cryptocurrency.

THE ROAD NEARLY EVERYONE TOOK



THOMAS SIBY
S4 CSE

The path was baffled indeed. When you just finish up your 10th grade and don't know which gear to shift to next. Most of us would have gone through the same except of course for the well determined ones who have either chosen their path or ones who decided they choose none. Everyone usually boasts about their summer vacations, but I was stuck and felt blue about my future. Yes, I knew that I had to take science but then again I had to choose between Computer; which I had no background with and Biology ;which was set for the medical aspirants.

Then the " Friends" factor came to play. Even though having no regard for medicine, I chose Biology. Till date, I claim it as the worst few years I had in my life. A kid struggling to keep his feet to the ground amid all these beautiful people who were mugging up their textbooks 24*7 for an entrance two years down the road.

It had finally come down to the wire. Now I had to choose my career. Once again, blue, baffled and heedless. My parents always wanted me to take up a professional degree and stated it as "safer option". I had nothing to argue against them, I couldn't even show up with another course which I wanted to take up passionately. My affinity towards literature had died after those two years of despair.

I had to make my move. My family was counting on me to stand up on my own and do something noteworthy. The move was made, Engineering it is.

Everyone remembers the first time they went to their college and I agree that the initial impressions were not great. Like, who would want to spend their 4 years in a single 5 storey building. But they really convinced my parents with their academic blaze. I was fine with anything, after all my 12th grade proved me that big infrastructures and all the bells and whistles mean nothing from the inside.

For the third time running, the word choice came back for one last time in my life (hopefully). I had to select my stream. This was quite a bit different than my earlier choices. I really had to have interest in a particular stream to choose it, or I knew it could be a pain in the back. And something not to my surprise, I didn't find a spark in anything. I knew I needed expert advice this time around, so I went up to my cousins; all of them Engineers and asked them the plain and simple question, " Which is the easiest one? ". I knew it never made any sense whatsoever but I had to move on.

When you discard your choice, fate comes to help you out. I "chose" Computer Science and Engineering and to my surprise, I was not the only one who came here out of the blue. Medical aspirants, repeaters, re-repeaters we had all sorts of people who had no idea of what they were in to.

First day of class, first day of transfiguring into something new. Set foot into the class a faculty; as the word professor seems old, a short guy with a wide smile, young and pleasant. He had a tough job in hand ; two dozen children having their first ever computer swotting. He was just splendid.

He's teaching our class for a fourth straight semester and I believe his course of action has influenced plenty of students including me on setting up a concrete base.

And as they say, when the going gets tough, the tough get going. To get convinced or to get confused was always the only trails.

When you do get befuddled make sure you wait and get some quality succor.

Two years down the road and now I am convinced. Life teaches you certain things, just make sure you get hold of the right stuff.

Choice, never ends. No one can excel at everything. There is always something there for you and trust me Computer Science packs up a whole lot of them. With new and new technologies evolving day by day, there will be more and more that could suit your skill set. One such thing which amazed me was Blockchain. It wasn't your usual coding stuff you get to relate with computer science, not everyone was into it, still it poked at me. It made me believe that each choice has a destiny. Unique for all. There never will be a drought for tech and it will get to you eventually.

Destiny will get to you in time, one doesn't have to be fretful about it.

The right choice is always about having the right people around you. I'm glad I have plenty, make sure you do too. And for one last time, forget about the choice,

WAIT FOR YOURS.



Did You Know?

>> The password for the computer controls of nuclear tipped missiles of the U.S was 00000000 for eight years.

CSI

A new luminary chapter to Christ College of Engineering.



MISHANA MOHAMMED
S4 CSE

The "Computer Society of India" is a professional body where computer professionals meet to exchange views and information, to learn and share ideas. The wide spectrum of members is committed to the advancement of the theory and practice of Computer Engineering & Technology Systems, Science & Engineering, Information Processing and related Arts & Sciences.

The computer society of India (CSI) chapter of Christ Engineering College was inaugurated by the CSI Kerala state student coordinator Dr. M V Rajesh. He shared his expertise and experiences of being a member of the CSI and apprised the students of its advantages and the various opportunities it offers. He appreciated the endeavors undertaken by the college and its keen interest in such pursuits.



To determine the best programmers among students a coding competition was held. Representing the prodigies among students, a special student masters program was conducted by Cyril Paul and Anand Antony.

Inventive and utilitarian ideas were presented by many student teams in the idea pitching competition and the best among them were selected and awarded.

The presidential address was given by Rev. Father John Paliakkara, Executive Director of Christ College of Engineering. Principal Dr. Sajeev John, Vice Principal Dr. V D John, Joint Director Father Joy Payyipilly, Student branch coordinator Raisa Varghese, Professor Premkumar and Student Branch Chairman Lazar Tony addressed the gathering.

Security.

Some people prefer open source software because they consider it more secure and stable than proprietary software. Because anyone can view and modify open source software, someone might spot and correct errors or omissions that a program's original authors might have missed. And because so many programmers can work on a piece of open source software without asking for permission from original authors, they can fix, update, and upgrade open source software more quickly than they can proprietary software.

Stability.

Many users prefer open source software to proprietary software for important, long-term projects. Because programmers publicly distribute the source code for open source software, users relying on that software for critical tasks can be sure their tools won't disappear or fall into disrepair if their original creators stop working on them. Additionally, open source software tends to both incorporate and operate according to open standards.

Community.

Open source software often inspires a community of users and developers to form around it. That's not unique to open source; many popular applications are the subject of meet-ups and user groups. But in the case of open source, the community isn't just a fanbase that buys in (emotionally or financially) to an elite user group; it's the people who produce, test, use, promote, and ultimately affect the software they love.



OPEN vs FREE vs FREE&OPEN

Free and open-source software (FOSS) or Free/libre and open-source software (FLOSS) is openly shared source code that is licensed without any restrictions on usage, modification, or distribution. Confusion persists about this completely unrestricted definition because the Free, also known as Libre, refers to the freedom or the product not the price, expense, cost, or charge. Conversely, Richard Stallman argues the obvious meaning of term open source is that the source code is public/accessible for inspection, without necessarily any other rights granted, although the proponents of the term say the conditions in the Open Source Definition must be fulfilled. Free and open should not be confused with public ownership (state ownership), deprivatization (nationalization), anti-privatization (anti-corporate activism), or transparent behavior.

OPEN SOURCE LICENSE

An open-source license is a type of license for computer software and other products that allows the source code, blueprint or design to be used, modified and/or shared under defined terms and conditions. This allows end users and commercial companies to review and modify the source code, blueprint or design for their own customization, curiosity or troubleshooting needs. Open-source licensed software is mostly available free of charge, though this does not necessarily have to be the case. Licenses which only permit non-commercial redistribution or modification of the source code for personal use only are generally not considered as open-source licenses. However, open-source licenses may have some restrictions, particularly regarding the expression of respect to the origin of software, such as a requirement to preserve the name of the authors and a copyright statement within the code, or a requirement to redistribute the licensed software only under the same license. One popular set of open-source software licenses are those approved by the Open Source Initiative(OSI) based on their Open Source Definition(OSD).



ANN MARY JIJU
S8 CSE

It was a great opportunity for us to do our third year internship at National Institute of Electronics and Information Technology (NIET), and we successfully completed our 7 days of internship on Big Data Analytics. From this internship we created a brief idea on Big Data Analytics. We chose this topic because these latest technologies have not been included in our syllabus. To make sure all the topics are clear and

of our internship we were taught about Hadoop, and R program.

R programming is a programming language and the platform we used was R studio as it is more advantageous when done in this. The best part is that it is more convenient to use R language than other programming languages in terms of variable declaration, data type and so on.

Hadoop is an open source framework for storing data on large clusters of commodity hardware. Doug cutting is the co-creator of Hadoop. It is a platform for distributing, computing problems across a large number of servers.

The classes were beyond our expectation. The faculties were very kind and were with a helped us throughout our internship. They had made this whole process of learning simple and interesting. We cannot thank them enough for the way they had treated us.

INTERNSHIP EXPERIENCE

effective the faculties had arranged lab sessions for each topic.

At first they created a basic idea on big data, and how it stands different from other conventional data base management system. As we all know It's a big task to analyse and to process the enormous collection of data sets that are generated day by day. In Big Data Analytics it examines large sets of data, identifies hidden patterns and make effective decisions on the current one and for the future data. The Big Data Analytics can be done mainly using three types of tools; they are Hadoop, Python and R program. On the first day we studied how Python can be used to process the data, mainly to retrieve and to manipulate it. Lab sessions were conducted for the same during the afternoon sessions. During the forthcoming days



Did You Know?

>> It is estimated that Google consumes the energy of 200,000 households each year.

>> 40-55% of all Wikipedia vandalisms are caught by a single computer program with 90% accuracy.

SMARTPHONES FROM CHINA



KARTHIK
S2

We are no longer in times we need a computer, we have everything we need in the palms of your hand, and most things can be done with a few touches. Keypads are long gone replaced by touch screens, though the good old flip phones are coming back with the recent additions of Galaxy flip, Z flip from Samsung and even Motorola's Razr, now we have fingerprint or iris locked devices our ancestors dreamt of in sci-fi.

With the rise of smart phones we have had the competition between Android and IOS, the two major players of the smartphone OS market, both leagues ahead of the others like Microsoft and other Linux based OS. Apple dominated the luxury and high end market for the initial years of smart phones, using high quality materials while the competition used low quality plastics, keeping the prices equally high in comparison to the android counterparts. The days have changed quite a bit the android devices have gotten better many of the brands increased the prices but many brands have found ways to cut down prices on devices. Especially Chinese companies like Huawei and OnePlus have started producing flagships that are on par with devices from tech giants like Samsung and Apple at half the prices.



Benefits of this for the users:

The user now has a greater variety of devices than ever before and the constant competition among the brands give the users great quality at phenomenal prices. The advantages can be summed among the following:

1. Smartphones have become affordable to all:

Devices like the OnePlus 6 of last year were comparable to the offering from Apple of the same year, while costing around half the price. Markets which have low income have greatly benefited from this.

2. Greater and more innovative features:

The constant pressure to keep up with competition from west makes the Chinese brands more innovative and makes them keep improving their devices. The facts I provided above hopefully makes you give smaller smart phone companies a chance and come out of the other side a happy user.

THE BEST LAPTOP FOR PROGRAMMERS



TERRANCE JOHNSON
S2 CSE

Laptops are as important to programmer as a musical instrument to a musical artist. So, selecting a good laptop is very important and no compromises should be taken with respect to it. I would like to explain some of the things to be kept in mind while selecting a good laptop followed by a few suggestions. One of the most important criteria is the display and keyboard. The display should have high clarity and be able to show a large amount of code. Retina and 4k displays are preferred. When compared, MacOS has the ability to show the most amount of code than other laptops. Keyboard preferences can be very subjective. It is better to go to a physical store and try typing on the keyboard. Always keep an eye out for unusual layouts (can make typing difficult), backlit (buy if you plan to do coding at night). Buy laptops with USB type C chargers as they are lighter and cheaper compared to chargers used in gaming laptops.



Consider the trackpad if you don't plan to carry around a mouse. Apple MacBook and Microsoft Surface series have really good trackpads. Try to buy laptops lighter than 4.5 pounds, anything else is going to feel heavy in your backpack.

Also make sure that the webcam has good clarity because coding is usually collaborative and there will be good use of it. Now coming to the CPU, buy a CPU with enough power but not too much because otherwise it can dissipate a lot of heat and heat up the laptop too much. An i7 should do the job. Coders should consider Linux or MacOS over windows because most of their code is going to run on servers which run on Linux and it's better to use Linux to avoid complications, also some IDEs only work on MacOS like XCode. 16Gb of ram is recommended although people working on large data sets will require rams up to 64Gb in size. For most coders 512Gb of SSD storage will be fine. SSD are important for faster reading and writing speeds. Again, special applications require higher storages. Now come the recommendations. The Apple MacBook Pro 16' meets almost all of the criteria except for the keyboard, which is a slight miss. Others are Lenovo ThinkPad X1 Extreme Gen 2, Microsoft Surface Book 2 15' and Aero 17.

Game Dev Report



ANAND ANTONY
S4 CSE



AARON MATHEW
S4 CSE

Video games are an art. This isn't debatable; we're well past this point now. Like any art form, game creation is typically driven by great passion. It's this passion that has fuelled many thousands of people to embark on their development projects. While it's true that there are now many game development courses available at a tertiary level around the world, there's no formal "game developer's license". To put it another way, there's no formal process one must go through to become a game developer.

If you're building a game, you're a game developer.

As gaming platforms, e-sports and immersive gaming technologies continue to explode in popularity across the world, they present a plethora of opportunities for brands, marketing and retail. While headlines continue to abound about Silicon Valleywood—Hollywood's merging with Silicon Valley—and the explosion of branded podcasts and audio content, from Audible to original Spotify shows, another expanding key entertainment channel has been relatively underexposed: the giant, global world of gaming. This, however, is all set to change, as Google, Apple and Microsoft have announced major moves into the industry.

“
*IF YOU'RE BUILDING A GAME,
YOU'RE A GAME DEVELOPER*
”

This report goes through and explores what's new and next in the gaming space, and what it means to brands. As gaming technology can now be seen everywhere, with platforms and games embraced globally by consumers en masse, gaming mechanics are being wrapped into mainstream entertainment, luxury retail and more.

Esports - The rise of a global phenomenon

Esports has risen from a latent trend in the 1990s to nothing short of its own entertainment industry, complete with much-followed celebrities and surrounding brand

Gaming platforms: the ultimate marketing channel

The battle for the title of the foremost esports and game streaming platform boils down to two main players: the Amazon subsidiary Twitch and YouTube. Over the last few years, the former has been increasingly pulling ahead of the latter.

Virtual reality, mixed reality, holograms and more: the future of retail immersion

Myriad applications have continued to experiment with, and refine VR—the experience of a fully simulated world through a headset and, in some cases, other sensory devices—and mixed reality (MR)—the blending and pairing of virtual elements with real-life objects that can be manipulated and interacted with. These range from gaming and entertainment to industrial applications, architecture and design, and customer service and retail.



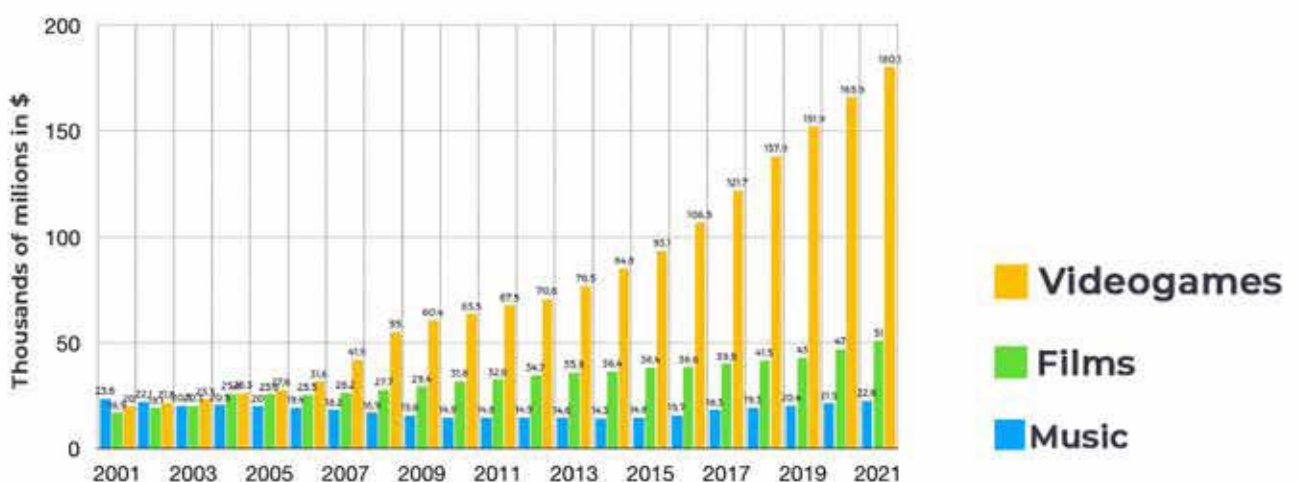


Mobile Gaming Empires

Mobile gaming is the future of gaming. In the last 20 years, mobile gaming has gone from the blinking pixels of Snake to massive online battles played simultaneously by thousands to millions across the globe, transforming mobile gaming companies into billion-dollar enterprises in the process. Considering the portability this platform brings, it's definitely going to have a major impact in this industry.

Gaming Economy

From the developers and designers who create the games to the e-sports athletes who compete on grand stages during tournaments, the global gaming economy is a major industry with over \$150 billion in gaming revenue and a 11 percent annual revenue growth.



From the above graph, it is clear that the revenue of the video game industry is rising and it is expected to continue this trend. But the major contribution to this income is from the in-game monetization, especially in mobile games. This is done through a process called micro-transaction. This rise in global economy, in the entertainment sector, has only gained attention lately that the number of people starting in to invest in this sector is rising over time.

Future of Game Development

There's no doubt that game development will go on as there are many passionate developers and artists, with ideas out of the world, who will work tirelessly. Even with the entry of AI there'll be no shortage of jobs in this sector as creativity is something unique to us, at least that's the way it is for now.

The rise in the number of game developers can be seen with the drastic amount of games released independently by several developers. Several of these "indie" developers are one man army.

If you are interested in learning game development, there are tons of resources out there and few industry standard beginner friendly engines to get you started. Another important push in game development as well as in other entertainment sectors is the crowdfunding and mega grants that is gaining traction. One of the most popular being the **Epic MegaGrant**, by one of the leading game developers Epic Games. This grant worth one hundred million dollars is distributed to not just game developers or other developers related to the gaming industry, but also to other entertainment sectors such as film, music, art, content developers, etc. and also to other technical developers not related to entertainment as well.

And it's worth mentioning that all these support shows each sector is dependent on each other in many ways. Gaming will never take over the whole entertainment industry. It will just set the bar higher for the other sectors to keep up.



ASIMO ROBOT

ASIMO (Advanced Step in Innovative Mobility) is a humanoid robot created by Honda in 2000. It is currently displayed in the Miraikan museum in Tokyo, Japan. The name was chosen in honor of Isaac Asimov.



Sam Smart
S6

DEVELOPMENT

Honda began developing humanoid robots in the 1980s, including several prototypes that preceded ASIMO. It was the company's goal to create a walking robot. E0 was the first bipedal (two-legged) model produced as part of the Honda E series, which was an early experimental line of the self-regulating, humanoid walking robot with wireless movements created between 1986 and 1993. This was followed by the Honda P series of robots produced from 1993 through 1997. The research made on the E- and P-series led to the creation of ASIMO. Development began at Honda's Wako Fundamental Technical Research Center in Japan in 1999 and ASIMO was unveiled in October 2000. ASIMO is an acronym which stands for Advanced Step in Innovative Mobility. The Japanese word Asi also stands for 'Leg' and Mo for 'mobility'. ASIMO is pronounced as 'ashimo' and means 'also legs'. In 2018, Honda ceased the commercial development of ASIMO, although it will continue to be developed as a research platform and make public appearances.

FORM

ASIMO stands 130 cm (4 ft 3 in) tall and weighs 54 kg (119 lb). Research conducted by Honda found that the ideal height for a mobility assistant robot was between 120 cm and the height of an average adult, which is conducive to operating doorknobs and light switches. ASIMO is powered by a rechargeable 51.8 V lithium-ion battery with an operating time of one hour. Switching from a nickel-metal hydride in 2004 increased the amount of time ASIMO can operate before recharging. ASIMO has a three-dimensional computer processor that was created by Honda and consists of a three stacked-die, a processor, a signal converter and memory. The computer that controls ASIMO's movement is housed in the robot's waist area and can be controlled by a PC, wireless controller, or voice commands

IMPACT AND TECHNOLOGIES

Honda's work with ASIMO led to further research on walking assist devices that resulted in innovations such as the Stride Management Assist and the Bodyweight Support Assist. In honor of ASIMO's 10th anniversary in November 2010, Honda developed an application for the iPhone and Android smartphones called 'Run with ASIMO.' Users learn about the development of ASIMO by virtually walking the robot through the steps of a race and then sharing their lap times on Twitter and Facebook..



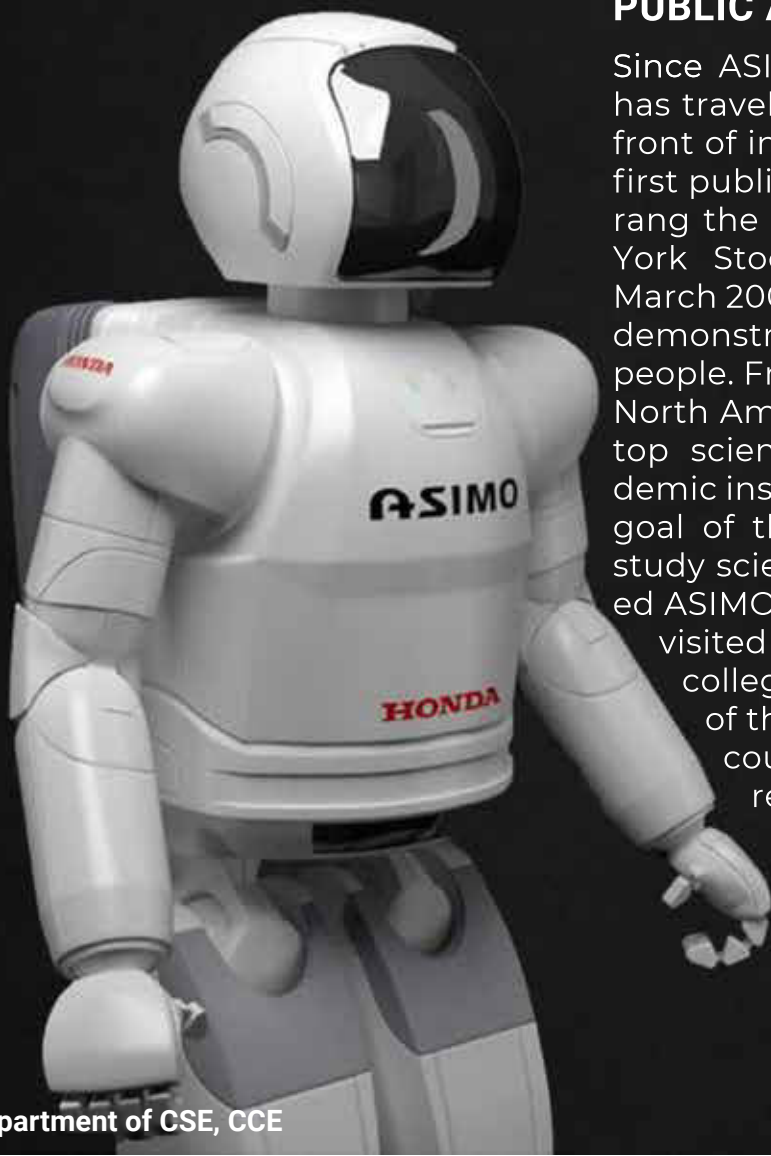
ABILITIES

ASIMO can recognize moving objects, postures, gestures, its surrounding environment, sounds, and faces, which enables it to interact with humans. The robot can detect the movements of multiple objects by using visual information captured by two cameras "eyes" in its head and also determine distance and direction. This feature allows ASIMO to follow or face a person when approached. The robot interprets voice commands and human gestures, enabling it to recognize when a handshake is offered or when a person waves or points, and then respond accordingly. ASIMO's ability to distinguish between voices and other sounds allows it to identify its companions. ASIMO can respond to its name and recognizes sounds associated with a falling object or collision. This allows the robot to face a person when spoken to or look towards a sound. ASIMO responds to questions by nodding or providing a verbal answer in different languages and can recognize approximately 10 different faces and address them by name.

Some sensors assist in autonomous navigation. The two cameras inside the head are used as a visual sensor to detect obstacles. The lower portion of the torso has a ground sensor that comprises one laser sensor and one infrared sensor. The laser sensor is used to detect the ground surface. The infrared sensor with automatic shutter adjustment based on brightness is used to detect pairs of floor markings to confirm the navigable paths of the planned map. The preloaded map and the detection of floor markings help the robot to precisely identify its present location and continuously adjust its position. There are front and rear ultrasonic sensors to sense the obstacles. The front sensor is located at the lower portion of the torso together with the ground sensor. The rear sensor is located at the bottom of the backpack.

PUBLIC APPEARANCES

Since ASIMO was introduced in 2000, the robot has traveled around the world and performed in front of international audiences. ASIMO made its first public appearance in the U.S. in 2002 when it rang the bell to open trade sessions for the New York Stock Exchange. From January 2003 to March 2005, the robot toured the U.S. and Canada, demonstrating its abilities for more than 130,000 people. From 2003 to 2004, ASIMO was part of the North American educational tour, where it visited top science and technology museums and academic institutions throughout North America. The goal of the tour was to encourage students to study science through a live show that highlighted ASIMO's abilities. Additionally, the robot visited top engineering and computer science colleges and universities across the US as part of the ASIMO Technology Circuit Tour to encourage students to consider scientific careers. In 2004, ASIMO was inducted into the Carnegie Mellon Robot Hall of Fame. In March 2005, the robot walked the red carpet at the world premiere of the computer-animated film, *Robots*.



ACCELERATING AAROGYA.....!!!



Team ALPHA

Ashkar Yaseen

Amal Davis

Ayarin Antony

Sakshi Manoj

Joan Vincent

Liya K.V

Sukrutha (Mentor)

Hands Behind AAROGYA

Rewinding the past 2 years of engineering life, it was our first ever attempt at a hackathon. **ALPHA**, a peculiar 6- membered team, comprising of **ASHKAR YASEEN, AMAL DAVIS, AYARIN ANTONY, JOAN VINCENT, LIYA K.V, and SAKSHI MANOJ** from S6 CSE, along with our mentor **SUKRUTHA** Ma'am, Asst. professor of Computer Science Department, set forth to participate in the Reboot Kerala Hackathon 2020, a Kerala Government initiative held at FISAT, Angamaly.

Getting acquainted

"**AAROGYA**", symbolizing health, is an android application that blends various facilities into a single platform.

For instance... Are all of us well-informed about the various facilities

Of course, there are meagre ways for knowing some, but currently, the Health Department does not have an efficient centralized system to provide the information to the public about various facilities such as the availability of blood in blood banks, availability of specialists at hospitals, availability of medicines in pharmacies, camps and seminars on various health-related topics, etc.

Our proposed solution 'Aarogya', acted as an interface between the public and the Healthcare Department. With the help of Aarogya, we intend to help the public with sharing information, alerts, and news regarding the Healthcare Department and also facilities available in the hospitals. There is a login for four actors- User, Hospital, Health Admin, Pharmacist. The application opens to a page for the four actors where, when we choose the type of login, it

redirects to the login page of the respective actors. In futuristic terms, when it comes to dealing with confidential data, blockchain could be incorporated into our application for ensuring security.

Into Reboot Finals

In the first stage, teams were asked to submit their solutions to the problem statements published by the organizing crew. The best and cost-effective ideas were filtered out for the second stage of the hackathon. The problem statements were released just 15 days before the hackathon. At the venue, we were given 36 hours for creating the project from scratch. Five rounds of judgement, constant motivation and



encouragement from the judges forced us up. Based on the implementation ease and novelty of the ideas, 15 teams were again shortlisted for the final presentation. And that's how we got into the finals. We began our project as a team, brainstorming our approaches and establishing our deadlines and individual responsibilities until Aarogya was set afloat.

Recounting the journey

As mentioned, Reboot Hackathon was a 36 hour Hackathon. And the process of creating a project from scratch during this period can be a daunting one. We could apply our efforts in so many different directions, and it's often challenging to get everyone on the same page. So, this is where we learned to work as a team. Sukrutha Ma'am was a constant support and her guidelines were most precious for us at each stage. We learned of various concepts that were untouched by academics. We were guided and mentored by a lot of industry experts, thereby we got to know of

skills that an undergraduate needs to fit in. Our team could never forget the support offered by our classmates, faculties, and college too.

Although we couldn't achieve a winning position, there was certainly something much more worthy that we brought back home- loads of memories, knowledge, experience and a stable team that has miles to go. We still move on with this project, improving it, to turn it into a reality and benefit everyone.



Did You Know?

>> CAPTCHA means...

"Completely Automated Public Turing Test to tell Computers and Humans Apart".

GRAPHICAL PASSWORD



Irin George
S6 CSE

Nowadays the passwords we use such as patterns, alphanumeric passwords etc are not safe. A graphical password application is a solution for this. Here graphical passwords are used such as images of fruits, cars, etc. It is a 4*4 matrix that contains images. The user has to select at least 8 images from the matrix. The main advantage is that it is less hackable because there are various types of graphical images so the hacker won't be able to crack. If you forget the graphical password you can recover this through fingerprint recognition. After downloading the application there are 4 steps to be followed to use the same. The first one is the registration and the second one is pattern lock. The third one is login and the last step is application access. So this paper is about graphical password application creation.

The first step in setting up a graphical password is to have an account for the user. To register in this application, the user has to sign up using their email and fill details. The details entered by the user are saved in the database. After that, the user has to give their fingerprint as a recovery option. The features extracted from the fingerprint are stored in the database. Next, a 4*4 grid appears which contains 16 different graphical images from which the user has to select a minimum of 8 images.

Then the user has to confirm the password. The user can select 8 or more images. The images can be repeated. The images in the grid change its position each time the user opens an application. Each image has a corresponding hexadecimal number from 0 to F. After choosing the sequence of images, they will be converted to their corresponding hexadecimal number. This collection of hexadecimal numbers is then given to a hashing algorithm. This encrypts the password. This is then sent to the database and stored.

Each time the user opens an app containing a password, initially the user selects the corresponding password. This is then converted to a hexadecimal number and hashing is done. Then it checks whether this password and the password that has already been stored in the database are the same. If both of these passwords match, the required app opens. The user can use his fingerprint as a recovery option in case he forgets the password. The user gives his fingerprint and the sensor extracts the features. This is done again for the confirmation and if both fingerprints match then the user is allowed to recover his password sequence. This is the simplest way to recover the password sequence with no further delay.

When the user tries to open an app from the restricted app list, the 4*4 grid of images appear. The user selects the password sequence in the correct order. These images are converted to their corresponding hexadecimal numbers. This collection of numbers is hashed and then sent to the database. It checks whether both the passwords are matching. If



The main advantages of this application is Improved security and privacy, Less hackable due to the use of graphical images. The user can easily recover the password in case they forget the password pattern. It is easy to remember the password pattern and hard to guess.

Graphical Password application allows the user to set a pattern password for using other applications. The pattern is some set of fruits that randomly changes its position every time you try to log in. The user has to provide their details for registration and then have to draw a pattern as a password by drawing it twice.

The user has to select an application while registration itself and can have multiple accounts for every single application. The pattern is a 4X4 Grid consisting of multiple fruits images, the user has to drag or draw at least over 4 fruits for the application to consider his pattern lock. The Application auto generates a Unique Id for every user who wants to register. After the user has successfully registered he is redirected to the Login page where the user has to provide his Id and Pattern Password from which the selected application by the user during the registration opens up.



Did You Know?

>> Up until the 14th of Sep, 1995, domain registration was free.

>> Bill Gates' house was designed on a Mac

EDGE COMPUTING THE POWERFUL FORCE FOR FUTURE OF IT



JASMINE JOLLY
Asst. Professor

In recent years, computing workloads have been migrating: first from on-premises data centres to the cloud and now, increasingly, from cloud data centres to 'edge' locations where they are nearer to the source of the data being processed. The goal is to boost the performance and reliability of apps and services and reduce the cost of running them, by shortening the distance data has to travel, thereby mitigating bandwidth and latency issues.

As the latency of computation increases in real-time applications using cloud computing in the era of IoT, instead of computing the data from different IoT devices in the central cloud, the computation is being performed on the devices itself or in the servers which are located in the edge of the network.

The ways to implement edge computing are either make resource-rich edge nodes or by interacting micro data centres with each other to execute the application. The edge computing comes to its full extent in the deployment

with the implementation of 5G.NFV (Network function virtualization) and SDN(Software-defined networking) are the technologies to be developed to implement 5G. In this paper, we discuss the developing stages of edge computing and the areas of technology explored by edge computing.

IoT devices are using the resources of the central cloud and use of IoT devices are globally increasing. As a result edge computing takes the opportunity for processing such a huge amount of data produced by a large number of IoT devices. The three capabilities of edge computing are decision making, filtered data transfer and local data processing which makes the edges a perfect place to deploy AI algorithms which in turn helps to move from the era of IoT to smartphones. Implementing deep learning models at edges requires exploiting GPU to speed up training. The collaboration of GPUs provided by the cloud providers such as AWS, Azure IBM with deep learning frameworks such as Tensor flow and PyTorch allows a massive acceleration in the training process

Next Year Intel will launch the next generation Movidius Vision Processing Unit. It is designed to accelerate AI tasks, particularly image processing, delivering performance up to six times the power efficiency of existing processors. According to Kwon Myung-sook, CEO of Intel Korea, "Forty-three per cent of AI tasks will be handled by edge computing in 2023."

The IT and computing industry has undergone three tectonic shifts in computer models since the 1960s. Centralized computers with mainframes gave way to client-server and distributed computing in the 1980s. The 1990s saw the rise of mobility. Smartphones, the internet, and eventually cloud computing emerged enabled by virtualization. This rise of the cloud saw a return to a more centralized compute model where compute resources are provisioned to users and workloads.



Did You Know?

>> One of the oldest websites on the internet is IMDb. and began on Usenet in 1990 as a list of "actresses with beautiful eyes."

Advantages of Edge Computing

1.Speed

The fibre optic technology enables the data speed as 2/3 rd of the speed of light still, the huge amount of data, for eg, up to 44 Zettabytes data are generating in 2020 makes edge computing a relevant area as the data does not need to be transmitted so long. The achieved speed in milliseconds with the fibre technology can be reduced to microseconds with the edge computing which makes tremendous changes in the industry of healthcare and business

2.Security

The distributed nature of edge computing architecture makes it easier to implement security protocols

3.Scalability

The development of cloud-based technology and edge computing technology helps the companies to scale their operations especially computing, storage and analytics capabilities.

4.Versatility

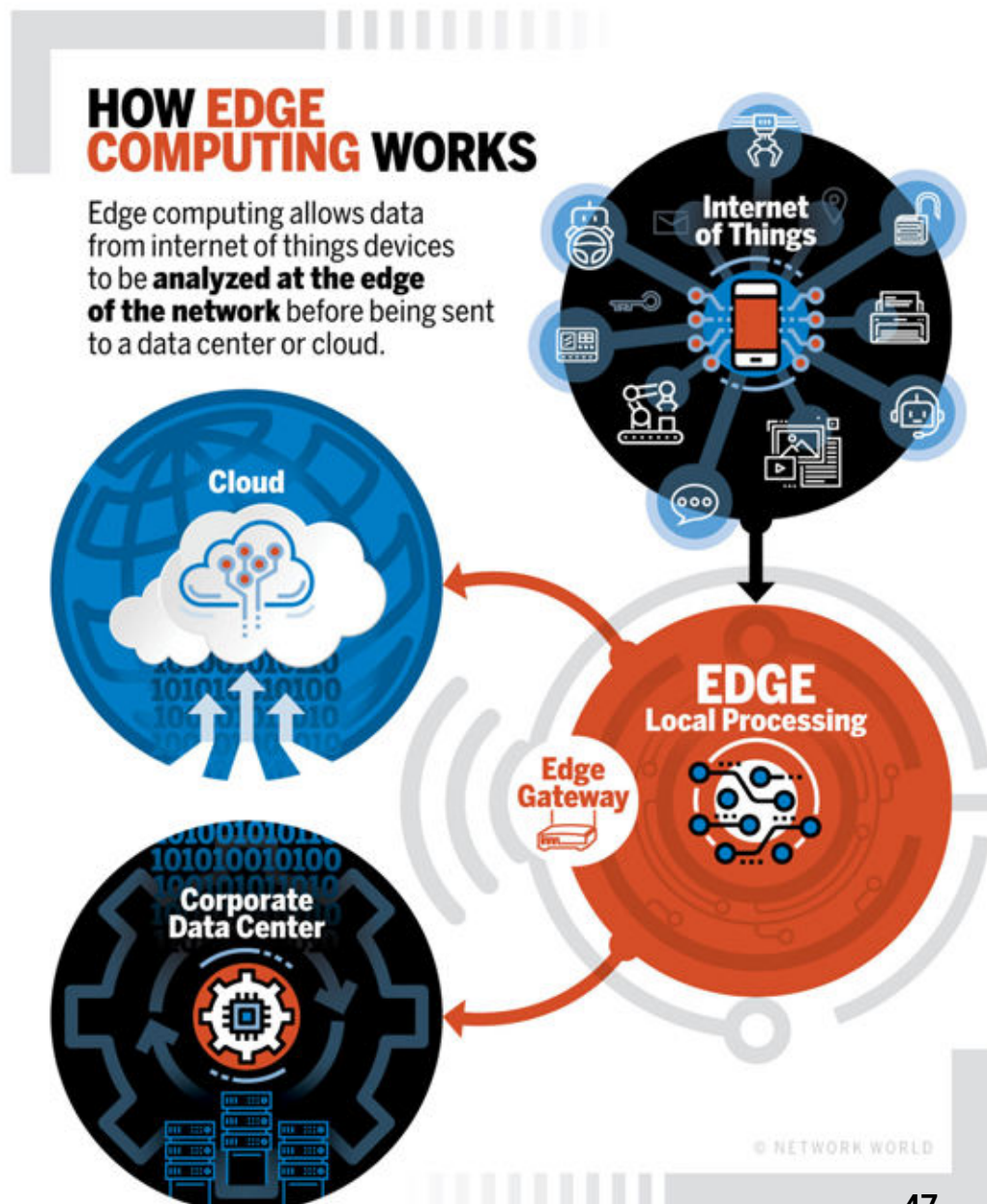
The scalability of edge computing also makes it incredibly versatile without having to invest in expensive infrastructure expansion.

5.Reliability

In the event of a nearby data center outage, IoT edge computing devices will continue to operate effectively on their own because they handle vital processing functions natively.

In its recent report “5G, IoT and Edge Compute Trends,” Futurium writes that 5G will be a catalyst for edge-compute technology. “Applications using 5G technology will change traffic demand patterns, providing the biggest driver for edge computing in mobile cellular networks,” the firm writes. It cites low-latency applications that include IoT analytics, machine learning, virtual reality, autonomous vehicles as those that “have new bandwidth and latency characteristics that will require support from edge-compute infrastructure.”

It is clear that while the initial goal for edge computing was to reduce bandwidth costs for IoT devices over long distances, the growth of real-time applications that require local processing and storage capabilities will drive the technology forward over the coming years.



SMART INDIA HACKATHON

TEAM RAPSODIANS

SIRIL SIJU
IRIN GEORGE
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NOVA MARY
ADITHYAN K S



Little did we know about the most dignified World's Biggest Hackathon -Smart India Hackathon until our team got its selection in 2019 as the only team from the 15 submissions from our college. And most of these submissions were those which had claimed prizes, lauded praises and even those which came up with super-efficient prototypes. We, the student community, count on our faculty and management for all our milestone accomplishments. Packing our bags and getting a train from "God's own country" to "The Pink City" happened just in the blink of an eye. That journey with six of us and our mentor Joju Mohan sir is one the most cherished and fun-filled trips. Forgetting all the complications of our project and the long journey for which we had set for, we spent time (in fact days) chatting, singing, playing and sharing. Our destination was JECRC University, Jaipur, Rajasthan. At early morning 5 when we had arrived at Jaipur there we

met our first challenge, he toughest one throughout our journey it was the sudden fall of temperature. By then our bodies which had already got adapted to completely hot sunny days in Kerala found it too much of a challenge in coping up with the brisk cold weather in Jaipur. By then came the college bus which was allotted to pick us from the station to the college. On the bus we had met 2 more groups one from Chennai and another from Punjab. It was great meeting them. We could feel our same excitement and strangeness in their eyes too. As the bus moved on "The Land of Royalty" unleashed its richness before us. The temples, palaces and forts took us to the richness of ancient Indian kingdoms at the same time the sky touched malls, corporates and deluxe luxurious hotels exhibited the hold of India in a fast-moving world. It was a picturesque of many generations in a single frame. On the bus we sat without uttering a

word completely mesmerized in the captivating beauty of this new land.

Meanwhile the bus had already reached our destined place -The JECRC University, the college as a whole was a huge architectural marvel perfectly constructed to cope with harsh climatic conditions of the state and provided residence to its students with all comforts and multitude of activities to get involved in. We could rarely find a course that this university had not provided, and that allowed us to meet several students who mastered different wonderful subjects in the world. Once we arrived at the registration desk, our conscious minds got into the realization about the actual purpose for which we had come here, which we had lost somewhere in our journey. That realization slowly started to create goosebumps inside us because both to our left and right and front and back we could hear the hustle-bustle of teams from the top Indian and National institutes. But with the help of our mentor Joju sir who backed us up now and then and trusting all the training that our own Christ College has prepared us for, we decided to give our best. The officials and students there provided the best hospitality and care they could provide. That evening which was the eve before the hackathon there was an ice-breaking session organized by the students there.

Each team from various states came out with their traditional song or dance. It was both fun and surprising to hear all those Punjabi and Gujarati folk songs, with some rap music, dance and acts. Anyhow we South-Indians too didn't want to stay back. Our team too came in front and then six of us along with our mentor started to sing that very beautiful song -" Kuttanadan Kunjayile". We could then see awe-struck faces of the North-Indian majority audience before us. But once the stanza-" Thititharo thitiye, thithey thakathakathimi thom" came out we saw the impact it made on the others, they found it as D.J mix and got out dance, this poured an extra energy to us and we made the best use of it. Party ended with a D.J mix consisting of songs from all states and gave us new friends and truly broke that ice between each of us.

Quite exhausted and drained out of energy we headed towards the college canteen where food was being served. It was more than a canteen, it had a small raised platform where individuals or groups would come and entertain others with their talents. We had our dinner at one of the tables arranged neatly outside the canteen under the moonlit sky, watching the performances going on the stage. Making an end to the tiresome day we headed towards our hostels hoping to have a good sleep.



A fine sleep was the only energizer to fuel us for the next 36 continuous hours of competition. The next day we got up early in the morning dressed in T-shirts that carried each of our names and the SIH logo, had a quick breakfast and headed to the venue where the competition was supposed to take place. We got our allotted table where we were supposed to spend our next 36 hours of coding, we got busy by settling into that little place putting up our flex board and trying to make that area our zone. The inauguration was done by Honorable Prime Minister of India, Sri Narendra Modi through a video conference and the Honorable Minister of MHRD, Sri Prakash Javedkar addressed us. We also got the opportunity to interact with the honorable minister. We had gotten selected for the problem proposed by TATA Motors in developing a mobile application to determine the battery status of a vehicle. During our coding session we had 2 rounds of review sessions which were done by 4 expert judges from TATA Motors before our final judgment. At the 1st 2 sessions they tracked the progress of our project and evaluated us on how efficiently we were able to implement their solutions in our model. Before we got into the final round of judgment we were pretty much confident that our application satisfied the requirements of the company. The final presentation went quite well too and all of us had that satisfaction glimmering in our eyes. Had a feeling of happiness and liberty that now we were free out of this 36-hour time-bound. By 8.00 pm on 3rd March, 2019 all across India the prizes under all the Ministries were declared and within moments later it was announced that team "Rapsodians" bagged the first prize under the Ministry TATA Motors in SIH 2019. Little did we know that we would bring back home a cheque of Rs 50,000 and the first crystal stoned trophy of the Worlds Biggest Hackathon to be showcased in our Principal's office when our dear Executive Director Fr John, our Principal, and our teachers blessed us and sent us out to this competition. Words wouldn't be sufficient to thank our mentor Joju sir who continuously assisted, mentored, guided us throughout this journey.

With those few days we had in our hand we managed to visit the Amber Fort an opulent palace made out of red-sand stones and marbles, The Albert Hall Museum which in its lighting effect, composed of different colors and shades during the night, makes the view even more spectacular, the Hawa Mahal in all its richness stood in its pride for being the reason why Jaipur is called the Pink City. But the greatest wonder of all was in getting the chance to view One of the Seven wonders of the world-the "Taj Mahal". That view was simply soothing to both eyes and mind. On our way back to Kerala all of us had too much to carry back with us, one week taught us several things, we made some distant friends, memories and had a trophy too to carry back.

Hence we had achieved a lot, it did make a greater contribution in molding us during our college days.



Did You Know?

>> Windows don't allow to create folder whose name as a CON, PRN, AUX, or NUL. These are keywords reserved by DOS.

There was a video game known as "Lose/Lose" its delete random file from your computer every time you kill an enemy.

CROSS-PLATFORM APP DEVELOPMENT



Cyril Paul
s4 cse

A step away from native

If you own a company and need an application for smooth functioning. Whether your company is creating a mobile application for the app stores or to use internally, you are often faced with the challenge of needing to develop it for multiple platforms. Typically, this means targeting both iOS and Android devices.

Unlike the early days of the "smartphone" era where many developers only targeted a single platform, market research today shows that the U.S. consumer market is about 47 percent Apple and 52 percent Android. As a key decision-maker or developer, how do you solve the problem of creating your mobile application for both these platforms?

For some, their company has the budget and resources to have two development teams,

each programming in the native environments for the platform. While developing in each platform's native tooling does give you the advantage of being closer to the platform, it comes with a cost.

Yes, there's the actual cost of hiring native developers from a smaller pool of talent, but, more importantly: Neither codebase you're building with is sharable. Whatever code the iOS team develops, cannot be reused by the Android team and vice-versa. You now have two separate codebases in existence, which must be individually maintained. So, if there is a change to the business logic or design that runs within your app, your company now must update and test both codebases for this change.

Beyond that, there is the added challenge of keeping

the user experience aligned across each platform. While you should follow the platform-specific user experience patterns, you still want the ability to provide custom touches to your application. Again, more work must be repeated.

That's where cross-platform development comes in: Cross-platform development is when you create applications for multiple platforms with a single codebase with very few to no change at all. Cross-platform development had been picking up the pace for half a decade now. It has become now in the industry one of the hotter fields. Some of the cross-platform development frameworks even allow users to build applications with just the knowledge of Web development.

Some of the major such frameworks available are:



Mobile application development frameworks are critical aspects of mobile application development companies. The business platforms are using these app development frameworks to leverage their possibilities because they are cost-friendly and time-saving as well, the trade-off may be the performance offered by native development but the immediate and easy development of production-level apps that these frameworks offer far outweigh the performance boost the other offers

“Defending the Roman Empire” - History and Prospects



NANDINI J WARRIER
Asst. Professor

Ancient history says that Rome was founded by Romulus and Remus in 760 – 750 BC on the banks of the Tiber in central Italy. With time, Rome rose in power and territory, until it became the epicentre of a powerful empire. In the third century AD, Rome dominated Europe, North Africa and the Near East. During its glory, the Roman army used forward defense strategy, deploying an adequate number of legions to secure on-site every region throughout the empire.

By 4th century A.D, emperor Constantine of the power diminished Rome faced a severe crisis. Rome was left with just 25 legions and had to protect the forward regions of the empire without compromising the safety of Rome. There were 8 regions to be protected. The regions were connected as depicted in Figure 1. Two regions are said to be adjacent if there is a line (edge) connecting them. A set of 6 legions comprise a “Unit”. A region is said to be safe from an attack if attacked region contains at least one unit or a unit can reach the attacked region in single step through an edge.

Moreover, a unit is permitted to move from one region to another only if the current location of the unit has at least one more unit stationed in it. A unit is said to be single step reachable to a region r_j from an adjacent region r_i if there is an edge connecting the regions r_i and r_j and the region r_i contains at least two units. The challenge faced by Constantine was to protect 8 regions with just four units.

Constantine placed two units at Rome and two units at Constantinople. This arrangement of units ensured that each region in the empire is reachable by a unit in single step, except for Britain. To reach Britain, a unit should move from Rome to Gaul (thereby secure Gaul) and a second unit should move from Constantinople to Rome, then from Rome to Gaul, and finally from Gaul to Britain, which totals to four steps. History says that Britain was lost! The strategic choice of Constantine to protect Rome depicts one of the many possible solutions. But it is not the only solution available. Another strategy [1] could be as follows. One unit is placed in Gaul, two in Rome, and one in Constantinople. Now, Britain can be reached in two steps. That is, by moving a unit from Rome to Gaul and another unit from Gaul to Britain. In this strategy Britain becomes safer. However, Asia Minor is no longer single step reachable. It has become two step reachable. A unit has to move from Rome to Constantinople and Constantinople to Asia Minor. The rest of the regions in the empire is reachable in single step. This strategy shows us another possibility, even though a strict comparison on which strategy is better is impossible.

The Constantine’s Roman empire protection strategy is currently known as Roman Domination problem. A Roman dominating function on a graph $G = (V, E)$ is a function $f : V \rightarrow \{0, 1, 2\}$ such that for every vertex u with $f(u) = 0$ is adjacent to at least one vertex v with $f(v) = 2$. The weight of a Roman dominating function is the value $f(V) = \sum_{u \in V} f(u)$. The minimum weight of a roman dominating function on a graph G is called the Roman domination number of G .

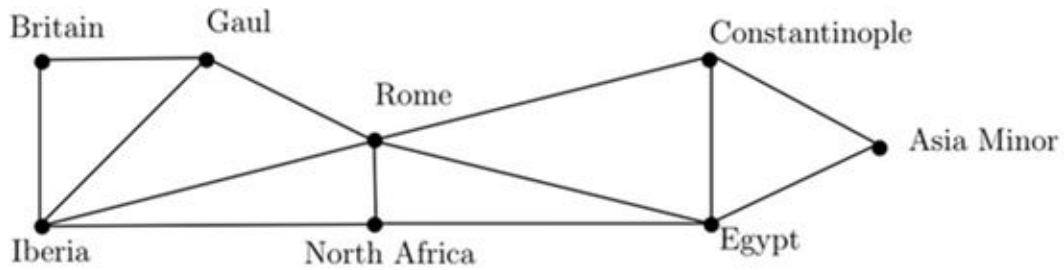


Figure 1: Graphical representation of Roman Empire.

In graph theoretical terms, a protection of a graph involves placing guards on the vertices of the graph so as to protect the graph against attacks on either the edges or the vertices of the graph. The graph protection problem has numerous variations based on the position of attack and the number of attacks. Many variations of the graph protection problem has been identified as NP-Hard.

One of the popular variations of graph protection is the k-server problem.

The k-server problem can be defined as follows: There are k- mobile servers (or guards) located at vertices of a graph. In response to an attack on an unoccupied vertex r_i , a server must move to r_i . The objective is to minimize the total distance travelled by all the servers over the sequence of attacks. Extensive research is still being carried in the area of graph protection as this may have profound impact in the area of computer security.



Did You Know?

>> The first game was created in 1961. Fun facts are that it didn't earn any money.

>> The language name C because it succeeds another language called B.

CS PIONEER BATCH

"A ship that never sinks is a Friendship. CCE is a home for friends, who can never be separated from a distance. It has been a wonderful 4 years at CCE. Proud to say that we are the first batch of CCE. It's not the space of campus that matters... It's the moments and memories that we made."

Anjana c

"Rewinding the four years of my college life I still remember the day when I first stepped into this college. I was so tense thinking about what sort of college it would be. I didn't know whether I could cope up with the new atmosphere. As we were the pioneer batch, the faculty were quite friendly. They took care of us and put their efforts to help and guide us. Our loving and dedicated teachers have put their efforts to build up a good personality within us. Initially, my life with friends was not so good. Sometimes it's hard to identify who our true friends are. But now I have many good friends who are still there with me. And I have met the best people here. I'm grateful to god for these blessings."

T J Kasmera

"If Someone asks me which was the best day of my life, I will only have an answer. The year 2015-2019, My Life in Christ College of Engineering

I felt like I was in heaven those days. The memories which I had with my idiot friends and friendly teachers were so special to me. Missing those days of Daily Morning Alarm, entering into the class, Sitting next to The besties, class hour snacks, gossips, silly fights selfies, sharing lunch boxes, assignments, sports, arts, Tour exams. Everything came to an end, but not the memories

CCE CS Department-Staffs, classmates, Juniors were all my family. I wish to go back to those beautiful days of my life. Always proud to say that we are the pioneer batch of Christ College of Engineering."

John Mathew

"It's always been a privilege to be the first batch of Christ college of engineering. This college gave us an experience worth a lifetime even within four years. Time flies so fast. When life gives you bad times, all you have to remember are those beautiful days.

The reason is the bond we had with the staff who were more like family and also the urge of the college fraternity to provide us with all the opportunities we deserved."

Jimpan Ouseph Christy



"Time flies. Wish I had some more years at college..it was a place of self-realization and created memories that would last more than a lifetime."

Christo Gracious

"Things end..... But memories don't!!
Those four walls of our classroom witnessed all our waves of laughter, fights, cries, naughtiness, class bunking, arguments, class time snacks, successful moments, failures & moreover our love....

For me, CCE holds a big box of memories of a lifetime with those people who live in my heart & whom I will never-ever forget..."

Silpa Sivadas

"CCE is always like a second home for us. In that, the CSE Department provides parental care for us, and it continues still now. At this time, we can truly understand the value of our teacher's bits of advice about life. Every bit of that advice helps to improve our today's life. Thanks to all the teachers and staff in CCE especially in the CSE Department for the wonderful experiences in the past four years.

Melwin Shajan

"Many moments in my life were first executed here. From nowhere to what I am today holds a banner, Christ. Each moment in my life I cherish being a member of Christ fraternity."

Diaz Davis

"I take this opportunity to thank our college management and staff for their continuous and relentless dedication, caring and support provided to us. As the pioneer batch of Christ College of Engineering, we shared an extraordinary bond as a family. A big thank you to our Computer Science Department for exhibiting us the right spirit and support all along the way. We were a family and continue to be one."

Thejus Menachery

